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STAFF PROJECT REPORT ON

APPRAISAL OF

A SECOND AGRICULTURAL CREDIT PROJECT

KOREA

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Agricultural Credit & DFC Division
East Asia & Pacific Projects Department

CURRENCY EQUIVALENTS

Won (₩) 1.00	=	US$0.00206
Won 485	=	US$1.00
Won 1 million	=	US$2,062

WEIGHTS AND MEASURES

Metric System

1 meter (m)	=	3.28 feet
1 square meter (m^2)	=	10.76 square feet
1 Kilogram (Kg)	=	2.205 pounds
1 hectare (ha)	=	3,000 pyongs
1 pyong	=	3.3 m^2

ABBREVIATIONS

NACF - National Agricultural Cooperative Federation
ORD - Office of Rural Development
MAF - Ministry of Agriculture and Fisheries
PKCs - Participating Kun (Gun) Cooperatives
TU - Technical Unit of NACF
LAOs - Loan Appraisal Officers of the PKCs

FISCAL YEAR

January 1 - December 31

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

STAFF PROJECT REPORT

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MAP

IBRD 10375

This report is based on the findings of the Appraisal Mission, which comprised S.J. Khoo, A. Soulard, G. Kalu (IBRD), W. Bilbo and V. Carlson (Consultants). The report was prepared by S.J. Khoo.

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

INTRODUCTION AND SUMMARY

I. Agriculture Sector

1. The extraordinary expansion of Korea's export-oriented manufacturing sector in recent years has, to a certain extent, obscured the tangible and impressive, albeit less spectacular, gains made by the country's agricultural sector; over the 1962-74 period its output increased by about 4% per annum (a rate comparable with that attained by Thailand, Indonesia and the Philippines). Korea's agricultural exports (including those of the fisheries sub-sector) rose from about US$70 million equivalent in 1967 to approximately US$423 million in 1974 and are estimated to have risen to over US$600 million in 1975. Further, despite the steady increase in industrial wages, rising agricultural productivity and increased farmgate prices have contributed towards the achievement of near-parity in the earnings of urban and rural households. These achievements are all the more commendable in view of the fact that, because of Korea's geo-physical features, only about a quarter of its total land area of about 10 million ha is cultivable.

2. About 22%, or 2.24 million ha, of Korea's total land area is cultivated. Another two-thirds are classified as forest land most of which being mountainous would not be suitable for cultivation. Additional land that can be brought into cultivation is consequently quite limited. Total cropped area was 3.29 million ha in 1974 giving a cropping intensity of 147%. Rice (1.2 million ha) and barley (0.9 million ha) are the major crops accounting for about two-thirds of the total cropped area. Pulses (mainly soybeans), vegetables, mulberry, fruits, tobacco and ginseng are the other important crops and together with miscellaneous cereals, viz. maize, wheat and millet, account for most of the remaining cropped area.

3. There are some 2.38 million farm households in Korea. The average farm size is about 0.9 ha. Nearly two-thirds of farm households have less than 1 ha of cropland but only 4% are landless largely as a result of the Farmland Reform Law of 1950 which imposed a ceiling of 3 ha of cultivated land per household.

4. The Government places high priority on expanding foodgrain production to supply as large a part of domestic consumption requirements as possible. Efforts to expand production, especially of rice, barley and soybeans are directed mainly towards increasing yields on presently cultivated land as new land suitable for cultivation is limited. Although rice yields are already high, further increases can be obtained through irrigation coupled with the wider use of high yielding and earlier maturing varieties.

5. As a result of rapidly rising per capita incomes and increasing urbanization, the consumption pattern of the population has been undergoing significant changes. It is estimated that the per capita consumption of foodgrains reached a plateau during the 1972-73 season. In contrast to this, per capita consumption of high value foods, especially fruits, vegetables and meat products have been increasing significantly. Thus between 1962 and 1974, while annual foodgrain consumption increased by about 4%, consumption of vegetables, fruits and livestock products increased by 8%, 12% and 11% respectively.

6. Reflecting the rapidly rising domestic demand for the high value foods, the other major strand of the Government's agricultural development strategy is the continued diversification and expansion of agricultural output into vegetables, fruits, livestock, mulberry, mushrooms, and tobacco to meet domestic consumption needs and for export. Increased production of these high income elastic commodities is an important way to raise the incomes of farmers and would result in fuller utilization of the available farm labor as well as more productive use of other agricultural resources.

7. The growth of agricultural output, which has been impressive as compared with other East Asian countries especially when the country's geophysical features referred to in paragraph 1 above are taken into account has nevertheless not kept pace with domestic requirements. This has caused the Government to be increasingly concerned with the need to raise agricultural productivity and to devote additional resources to the development of the agriculture sector. More than three times the resources budgeted for agriculture in the previous Five-Year Plan (1967-71) are included in the current Plan (1972-76).

Fourth Five-Year Development Plan (1977-81)

8. The proposed project would fit into the programs embodied in the new Development Plan being formulated by the Government for the period 1977-81. The objectives of the Plan in the agricultural sector are: (a) the expansion of agricultural production and rural incomes; and (b) the further diversification of agricultural output through expansion of sericulture and the production of nutritionally superior horticulture and livestock products.

Support Facilities

9. Research, Extension and Marketing. Research on fruits and vegetables is undertaken primarily at the Horticultural Experiment Stations, and includes development of improved varieties and cultural practices, and use of fertilizers and pesticides. Storage problems are also being investigated with a view to developing suitable storage facilities for the various fruits and vegetables. The Suweon Sericulture Experiment Station has been involved in sericulture research since 1914. It is presently undertaking research in four main areas - breeding of disease resistant and more productive silk worm varieties, improvement of rearing techniques, development of higher yielding mulberry trees, and improvement of silk-reeling techniques and silk processing. The research

and experiment stations are operated by the Office of Rural Development (ORD) of the Ministry of Agriculture and Fisheries. The stations' specialists and ORD's extension officers provide technical advice and extension support to farmers. Extension guidance is also provided by the Horticultural Cooperatives and Sericulture Associations of which most of the farmers are members.

10. The cooperatives, which are part of the National Agricultural Cooperative Federation's (NACF) network of cooperatives, are engaged in the marketing of farmers' output which is sold at NACF's crop and livestock auction centres located in the urban areas. In addition, they provide their farmer members with supplies of agricultural inputs.

11. Agricultural Credit and Subsidies. The total amount of credit made available to farm households from institutional sources increased steadily over the past decade from about 2,000 Won per farm household in 1964 to over 6,000 Won in 1974. 1/ However, in 1974 institutional credit represented only about 25% of total outstanding borrowings with the remainder provided by non-institutional sources. NACF is the main source for institutional credit for the agricultural sector in Korea. The terms and conditions of its loans vary with the purpose and the source of funds and are controlled by the Government. Part of NACF's operations are funded by borrowing from the Government which charges interest varying from 2 to 5% per annum; these funds are used to provide medium-term loans primarily for agricultural production. Borrowings from the Bank of Korea at interest rates varying from 2 to 6% are used to finance NACF's fertilizer operations, the purchase and export of agricultural products and credit sales of agricultural inputs. Short-term loans to depositors and cooperatives are made from NACF's deposit resources as a normal banking service; the interest rate charged is 15.5%, the same as applied by the commercial banks. Medium- and long-term loans are made by the Kun Cooperatives, and short-term financing of agricultural inputs is handled by the Primary Cooperatives. NACF loan interest rates range from 3.5% for irrigation associations to 15.5% for commercial loans. Interest charged on the bulk of NACF loans is between 9 and 12%.

12. In addition to interest subsidies, the Government provides farm inputs, such as fertilizers and farm implements, to farmers at subsidized prices. It has also provided price supports for certain products produced by farmers, e.g. through the operation of the Grain Management Fund. However, in recent years the Government has begun to reduce the levels of subsidy partly because incentives of the magnitude provided previously are no longer needed to boost production.

The Bank Group Lending Program

13. The Bank Group's lending for the agricultural sector in Korea has been aimed at assisting in the achievement of the Government's objectives. Of the US$145.5 million lent, to date, for agricultural projects, US$93 million

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1/ Based on a sample survey of farm households in 1974.

was provided for the Pyongtaek Kumgang (Loan 600-KO) and Yong San Gang (Loan 795-KO-Credit 283-KO) Projects, which are expected to provide irrigation for 60,000 ha; US$10.5 million has been made available for an Agricultural Credit Project (Credit 335-KO) which supported a three-year lending program for the provision of medium and long-term credit to Korean farmers through NACF to develop orchards, sericulture, poultry, and swine; a US$7.0 million Loan has been made for a Seeds Project (Loan 942-KO) which is helping to develop higher yielding varieties of cereal crops, oil seeds and potato for multiplication and distribution to farmers; US$13.0 million has been lent for the Integrated Agricultural Products Processing Project (Loan 994-KO) aimed at combining the on-farm production of commercial crops on land that was idle or under-utilized with efficient and hygienic processing facilities. A US$7.0 million Credit (234-KO) and a US$15 million Loan (1193-KO) have helped finance two livestock projects the main components of which are the establishment of small and medium size dairy farms by providing long-term loans to dairy farmers, the construction and operation of dairy products processing plants and the provision of management and technical services related to these activities. In addition, a US$20.0 million Bank Loan and a US$40.0 million Third Window Loan (1216-KO & 1218T-KO) are helping finance a Rural Infrastructure Project involving the construction of minor irrigation facilities, roads and bridges, water supply systems, the provision of rural electrification, the development of fuelwood blocks, and upland reclamation.

II. The First Agricultural Credit Project (Credit 335-KO)

14. The project, which formed part of the Government's program for agricultural development under the current Five-year Development Plan (1972-1976), provided funds to NACF for: (a) medium- and long-term lending to farmers for investments in orchard, sericulture, poultry and swine development; (b) construction of training facilities at NACF's Cooperative College; (c) a farm management consultant to assist in project lending to farmers; and (d) a management study of NACF. Of the total project cost estimated at US$18.2 million during appraisal, IDA financed 58%, the Government 23%, and participating farmers the remaining 19%.

15. The IDA credit of US$10.5 million for the project became effective in May 1973. Project implementation had been satisfactory and was completed in May 1976, about a month ahead of schedule. Project lending for on-farm investments totalled about W 5,970 million involving 6,114 sub-loans. Lending by sub-projects and IDA disbursements as of May 31, 1976 were as follows:

	Sub-Loans		
	Number	Amount (₩ million)	IDA Disbursements (US$ thousand)
Orchard:			
Apple	1,870	2,624	
Pear, Peach & Grape	752	738	
Sericulture	2,553	1,418	
Poultry	157	378	
Swine	782	812	
	6,114	5,970	10,030
Farm Management Consultant			75
Training Facilities			215
Management Study			180
Total			10,500

Total sub-loans made were only about one-half the number estimated during appraisal due to inflation which far exceeded the 15% contingencies provision. Building costs, the largest item in the subprojects, averaged about twice the appraisal costs, and significant cost increases in excess of the contingency provision were recorded for all the other investment items. With regard to the distribution of sub-loans by sub-projects, the reduction in the number of sericulture sub-loans accounted for most of the difference between the actual lending and appraisal estimates. The increases in sub-loans for apple orchard and swine development were largely offset by corresponding declines in the other fruit and poultry sub-loans. These differences were mainly the result of unforeseen price and demand changes and appear to represent a reasonable response to changing conditions.

16. Under the project, a Technical Unit (TU) was established in NACF to oversee project implementation, and particularly to monitor and supervise lending to farmers through the Participating Kun Cooperatives (PKCs). The TU has carried out its functions satisfactorily; it has also helped to select the PKCs, provided technical advice, and trained the Loan Appraisal Officers of the PKCs in proper sub-loan appraisal and supervision. Since the inception of the project, a total of 59 PKCs have been involved in project lending and 123 Loan Appraisal Officers (LAOs) have been trained.

17. The TU surveys indicate that total project investments made by participating farmers as of the end of December 1975 amounted to an estimated ₩ 7,808 million (US$16.1 million). Major investment items include: (a) 2,181 ha of new orchard development of which apple orchards accounted for some 1,844 ha, (b) 24,887 pyongs (82,130 m^2) of storage space for fruits, (c) 461 ha of mulberry plantings, (d) 56,230 pyongs (185,560 m^2) of rearing house space for raising silkworms and cocoons, (e) 24,713 pyong (81,550 m^2) and 13,300 pyong (43,900 m^2) of rearing house space for swine and poultry respectively, and (f) irrigation facilities, equipment and other tools in support of the major investment items. The average size of sub-loans was about 976,000 won (US$2,000).

18. It is still too early to evaluate the project's benefits and impact, because several more years are required for it to reach full development. However, in addition to the development and expansion of the sub-projects concerned (para 17), the project has had significant institution-building effects for NACF and the PKCs. Thus, the method of appraising project investments in terms of their technical feasibility and financial viability based on incremental returns and the need for regular supervision of project investments during their implementation are becoming increasingly appreciated by NACF and the PKCs. In fact, NACF is considering applying this approach to its other agricultural lending as well. Provision of training facilities, construction of which was completed in October 1975, would increase the output of trained personnel, and the management study completed in December 1975 would improve NACF's management of its large and diverse operations.

III. The Project

Project Concept

19. The proposed project would be a continuation and expansion of the agricultural development program financed under the First Agricultural Credit Project (Credit 335-KO). It would provide medium and long-term loans through selected Kun Cooperatives of NACF to about 7,900 farmers for investments in: (a) apple orchard development, (b) silkworm rearing houses, (c) sprinkler irrigation for orchards, (d) greenhouses for vegetable production, and (e) on-farm storage for fruits. Similar sub-projects were financed under the First Project except for green houses. The proposed project would support a three-year lending program which would be part of a high priority Government program to increase farm output and incomes through diversification and modernization of agricultural production. It also aims at making more efficient and fuller use of available agricultural resources, thereby enhancing the employment opportunitites, productivity and incomes of participating farmers. Determination of project size was based on estimates of farmer demand and the loan processing capacity of the on-lending institutions (Kun Cooperatives) over a three-year period. In making the determination, account was also taken of domestic consumption projections and export prospects of the Project output, and the availability of complementary resources.

Description of the Project

20. Apple Orchard Development. This sub-project would finance expenditures for the establishment of about 2,100 ha of apple orchards. Major investment categories would be: land clearing, preparation, levelling and terracing; orchard establishment, including improved planting materials, fertilizers, pesticides, and hired labor; and spraying facilities and other small hand tools. Most of the apple orchards to be developed would range from one to two ha and would be planted with improved varieties. Subloans would be made to about 1,400 farmers and would only be given for orchard establishment in soils considered suitable by the Institute of Agricultural Sciences in Suweon.

21. Silkworm Rearing Houses. The main purpose of this sub-project is to increase the productivity of sericulture production without the need to expand the existing acreage under mulberry. The sub-project would provide improved silkworm rearing houses and equipment to enable sericulture farmers to expand as well as improve the quality of cocoon production. It would also finance the first year's cost of improved inputs to existing mulberry plantings, mainly fertilizers/manure, pesticides, and hired bullock power and manual labor. Sub-loans would be made to about 3,500 sericulture farmers owning 0.35 ha or more of mulberry plantings that would provide sufficient leaves to feed the quantity of silkworms envisaged. The typical sub-loan would finance an improved rearing house of about 20-25 pyongs (66-83 m^2) floor space, and equipment, the major items of which would be pivot cocoon beds, wooden racks and trays for silkworm feeding, and a two-wheel cart. The rearing capacity would be five cases of silkworms per crop, or ten cases for the two-crop year.

22. Sprinkler Irrigation for Orchards. Many existing orchards, especially those on sandy or volcanic ash soil, suffer from insufficient available soil moisture. Consequently, apple orchards in areas of lower rainfall, where near-drought conditions occur frequently during certain periods in the hot summer months, generally produce smaller fruit with a high incidence of skin cracks and poor coloring. Experience in recent years confirms that sprinkler irrigation would be the most appropriate means of overcoming this problem, though surface irrigation would be helpful for some orchards. About 800 farmers, each owning 2 ha or more of producing orchards, would be given sub-loans under this component. Sprinkler irrigation normally cannot be justified on orchards of less than 2 ha. Eligible orchards would have soil and rainfall conditions described above and have an available supply of water sufficient for irrigation needs. Major investment items for a 2 ha orchard would include a concrete well, diesel engine and pump, pipes and fittings, and installation costs. Although some of the sub-loans would be made for pear and orange orchards, most are expected to be made for apple orchards.

23. Greenhouses for Vegetable Production. In response to rising incomes, there is a rapidly growing demand for fresh vegetables during the cold months of the year. Existing greenhouses are inadequate to meet present demand and many are inefficient. About 1,200 farmers would participate in this subproject which would finance the cost of constructing and equiping improved greenhouses. Major investment items would include: metal frames for the greenhouses; ventilating, heating and irrigation equipment and facilities; and incremental working capital required to produce the initial crop of vegetables. Sub-loans would be made to farmers who are experienced in greenhouse production, and have easy access to important urban consuming centres.

24. On-Farm Fruit Storage. Apple, pear and orange growers with storage facilities, who market only some of their production at harvest time and store the larger part for sale over the following months, have

been able to obtain prices and financial returns which are significantly higher than those received by growers who sell all their output at harvest time. As a result, there is an increasing demand for on-farm storage facilities. About 1,000 sub-loans would be made under the sub-project to finance concrete storage buildings, wooden packing cases, and ventilating fans. Although the capacity of the storage buildings would vary according to sub-borrowers' needs, the majority would have a floor space of about 20 pyongs (66 m^2) or a maximum storage capacity of about 30 tons of apples and pears or 20 tons of oranges.

Project Cost and Financing

25. Cost Estimates. The total cost of the project is estimated at about ₩ 19,978 million (US$41.2 million), of which about 31%, or ₩ 6,207 million (US$12.8 million), would be the foreign exchange component. Estimates are based on current prices, including the cost of installation. A price contingency of 28% had been added to the base costs on the assumption of price increases of 15% in 1976 and 10% in each of the years 1977 and 1978. Detailed cost estimates are given in Chapter G. They are summarized below:

	Local	Foreign	Total
		US$'000	
Apple Orchard Development	5,573	1,958	7,531
Silkworm Rearing Houses	5,818	2,376	8,194
Sprinkler Irrigation	2,404	1,967	4,371
Green Houses	5,051	2,602	7,653
On-farm Storage	3,411	1,137	4,548
Price Contingency	6,137	2,758	8,895
Total	28,394	12,798	41,192

26. Financing. The project would be financed as follows:

Source	Amount (US$ million)
Bank	20.0
Government	8.8
Subborrowers	12.4
Total	41.2

The proceeds of the proposed Bank loan will be on-lent by the Government to NACF at the same interest rate as applicable to the Bank loan with repayment over 17 years. The Government's contribution would also be repayable by NACF over 17 years with interest at 5.7%. The funds would be onlent by NACF to participating farmers through the Kun Cooperatives.

Production and Market Aspects

27. The annual incremental output of the project at full development would be as follows:

	Full Development Year (1)	Annual Incremental Project Output (2)	Annual Domestic Demand at Full Development Year /a (3)	Domestic Production in 1974 (4)	(2) as % of (3)
		('000 tons)			
Apple Orchard					
Apples	1990	69.2	753	297	9.2
Silk Worm Rearing Houses					
Cocoons	1981	0.81		37.2	
Sprinkler Irrigation					
Apples	1990	9.4	753	297	1.2
Green Houses					
Cucumber, Green Pepper	1980	13.1	150 /b	49 /b	8.7

/a Based on present trends in population and per capita income growth, and estimated income elasticities of demand.

/b Main vegetables grown in green houses consisting of cucumber, green pepper, tomato, squash, lettuce, and melon.

28. Incremental output from all the subprojects except sericulture would be primarily for the domestic market. The annual incremental output of apples and vegetables would be easily absorbed by the domestic market since they would account for only minor proportions of the production increases required to meet their projected demand. There would likewise be no difficulty in marketing the project's annual incremental cocoon output since the amount involved is small in relation to total domestic production. Moreover, the

decline in Korea's silk exports in 1973/74 which resulted from the recent world-wide economic recession, is expected to be reversed in the near future, as Japan and the other major silk importing countries are already in the process of recovering from the recession.

Project Implementation

29. The National Agricultural Cooperative Federation (NACF) would administer the project. Project loans to farmers would be made by the Kun Cooperatives. The Technical Unit (TU) established under the First Project would supervise and monitor project implementation. It would also advise and train the staff of the Kun Cooperatives in proper appraisal and supervision of project loans. In view of the larger size of the project and the introduction of new types of sub-projects, the TU staff would be strengthened. The Project Coordinating Committee to ensure overall coordination between NACF and other agencies involved in the First Project will be maintained for purposes of the proposed project.

30. Established in 1961, NACF fulfills a dual, closely integrated role. As the apex organization of a three-tier agricultural cooperative structure in Korea, it supervises and coordinates the operations of its member cooperatives, which comprise Kun (county) Cooperatives, Primary Cooperatives, and Special Cooperatives for horticulture and livestock farmers. NACF also functions as an instrument for the implementation of national agricultural policies. It undertakes a variety of credit and non-credit activities including the distribution of agricultural inputs and supplies, marketing, banking, mutual insurance, guidance and training. In all these operations, NACF receives substantial financial support from the Government and the Bank of Korea which is the country's central bank. NACF recently embarked on a major reorganization of the cooperative structure which is to be completed in 1977; it would involve a reallocation of functions between the Primary and Kun Cooperatives whereby all short-term production credit and non-credit activities would be undertaken by the 1,545 Primary Cooperatives, while the Kun Cooperatives would handle medium and long-term credit and exercise audit functions over the Primary Cooperatives on behalf of NACF.

31. The General Assembly of NACF is the representative body of the member cooperatives (Kun and Special Cooperatives). The Representatives Meeting elected by it approves NACF's annual business plan, budget and accounts. The Administration Board, the policy-making body of NACF, consists of the President of NACF (appointed by the President of the Republic of Korea), representatives of the Ministries of Agriculture and Finance and the Bank of Korea, and five delegates elected by the Representatives Meeting. The President of NACF is assisted by an Executive Vice-President while six Vice-Presidents supervise the various departments. NACF has a staff of approximately 2,100 of whom about a third are professionals. It operates an Agricultural Cooperative College and two other training institutions, the Saemaul Leaders Training Institute for farm leaders and the Cooperative Training Institute. Many of the graduates of the College and the Cooperative Training Institute are employed by NACF and its cooperatives.

32. Loans advanced by NACF and Kun Cooperatives grew from W 222 billion in 1971 to W 449 billion in 1974 and outstanding loans rose from W 123 billion to W 252 billion during the period. NACF's loan collection record is satisfactory. The ratio of arrears to outstanding loans was 4.1 percent at the end of 1974. Net income in 1975 was W 1,818 million compared with W 950 million in 1974 and W 442 million in 1973.

33. The Technical Unit (TU). For effective implementation of the proposed project, the TU established under the First Project would be strengthened by the inclusion of three additional technical staff comprising an agricultural economist, and two horticulturists specializing in green house vegetable production and sprinkler irrigation for orchards respectively. They would be appointed and in position within three months following Loan effectiveness.

34. Kun Cooperatives. The 140 Kun Cooperatives with their 211 branches function at the intermediate level of the three-tier cooperative structure. NACF and Kun Cooperatives are distinct legal and financial entities but are closely integrated in regard to management, resource mobilization, and lending operations. The Kun Cooperatives handle NACF's credit and non-credit activities at the county level and act as a channel for funds to their member Primary Cooperatives. In the framework of the reorganization mentioned in para 30, the number of branches will be reduced and the Kun Cooperatives will concentrate on banking activities such as the mobilization of deposits and the provision of agricultural development loans. As under the First Project, Kun Cooperatives will be required to meet the following conditions in order to participate in the proposed project:

(a) Overdues at the end of the preceding financial year would not exceed 10 percent of loans outstanding;

(b) There would be at least one Loan Appraisal Officer in the Kun Cooperative working full-time on project loans, the actual number to be commensurate with the workload; and

(c) Adequate extension support would be available for project farmers.

35. Project Coordinating Committee. A Project Coordinating Committee was established under the First Project to ensure coordinated planning and execution of project operations between NACF and other Government agencies. Constituted under the Chairmanship of the Vice President of NACF responsible for the Project, the Committee includes representatives of the MAF, Office of Rural Development, Economic Planning Board, Ministry of Finance, and the Agricultural Development Corporation, with the Project Manager who heads the TU as its secretary. The Committee played an important role in the timely and effective implementation of the First Project. In view of this, the Committee is to be maintained to carry out a similar role under the proposed project.

36. Procurement. Project investment items and operations on individual farms are varied and small, and therefore would not be suitable for international competitive bidding. The scattered location of farms and the fact that project investments would be spread over several years, are additional factors which would discourage interest by foreign firms. Silkworm rearing houses, on-farm storage, and green houses are simple structures and would be constructed by local artisans and in some cases by the farmers themselves. There are numerous suppliers of project equipment and services, both private companies and cooperatives. Prices are competitive. Project procurement would consequently be through normal commercial and cooperative channels by the individual farmer subborrower as in the First Project.

37. Disbursement. Disbursement of the proposed Bank loan is expected to extend over three years. Against appropriate statements, disbursements would be 70% of sub-loans to beneficiaries made by the Participating Kun Cooperatives (PKCs). The documentation for the sub-loans for reimbursement certified by the PKCs would be retained on file at NACF, and be available for review by Bank supervision missions.

38. Relending Terms and Conditions. The Government would make available the Bank Loan and its share of the total project cost to NACF for on-lending by the Kun Cooperatives to subborrowers. The TU would ensure that the Kun Cooperatives selected to participate in the project have met the conditions specified in para 34. Project investments would be evaluated in terms of their technical feasibility annd financial viability based on incremental returns. Sub-borrowers would pay an annual interest rate of 12%. This is the maximum rate currently applicable to Government sponsored agricultural credit programs. The interest rate charged under many of these is only 9%. NACF and the Participating Kun Cooperatives (PKCs) would require minimum interest margins of 1% and 3% respectively to cover administrative costs and provisions for bad debts. The 4% percent interest margin and the 8.9% interest on the Bank Loan would consequently require that the cost of the Government funds to NACF would be at 5.7% interest, given the 12% interest charged to subborrowers, and the proposed contributions to total project cost by the parties concerned (para 26) and the repayment of the Bank Loan and Government funds by NACF to the Government over 17 years, including 3.5 years of grace. The Government would bear the foreign exchange risk. Since it is essential to ensure that the incremental working capital necessary to produce the initial output and sales from project investments is available, such capital should be provided by the Government or NACF if not available from other sources. NACF will establish an account called the Special Fund which would comprise proceeds of the Bank Loan and Government loan (4,300 million Won). The Government will deposit in the Special Fund (a) not later than April 1, 1977 an initial amount of not less than 700 million Won to enable NACF to initiate Project lending, and (b) thereafter at the beginning of each quarter such amounts as shall be required during such quarter by NACF for the purpose of the Project. The total of the Government loan would be made available to NACF not later than January 1, 1980. Agreements acceptable to the Bank would be entered into between the Government and NACF, and NACF and the PKCs incorporating these terms, and the execution of these agreements would be a condition of loan effectiveness. The

term of each subloan would be determined by the repayment capacity of the sub-borrower. Financial models for typical subloans indicate that loan repayment schedules need not exceed the limits shown below:

Subloan	Grace Period	Period of Repayment	Loan Period
	Years		
Apple Orchard Development	7	4	11
Silk Worm Rearing Houses	2	7	9
Sprinkler Irrigation	3	5	8
Green Houses	1	5	6
On-Farm Storage	2	8	10

Financial and Economic Analysis

39. The project would directly benefit about 7,900 farmer sub-borrowers and their families or a total of some 47,000 persons. At full development, the additional labor required annually is estimated at about 7,200 man year equivalent (1,806,000 man-days). It is envisioned that part of the labor required would be supplied by family labor. At current prices, the estimated annual incremental output at full development, ranging from about 5 to 15 years, would amount to about US$32 million. The increased production of fruits and vegetables and their extended marketing season would enhance the nutritional standard and variety of the local diet. In addition to providing increased employment and incomes to the farmer sub-borrowers, a further significance of the project is the fact that a greater part of the increased output would be the result of a fuller and more efficient use of existing land and labor resources through improved technology.

40. The financial rates of return for the subprojects would range from 27% to 35%. With appropriate adjustments for taxes and subsidies, and based on current prices, the economic rates of return would range from 29% to 38%. With additional adjustments using estimated shadow prices for foreign exchange, the rates would range from 27% to 36%. An increase in the cost of the Project investments of 20% without increasing the value of the benefits would result in rates from 21% to 30%. The figures would be 20% to 29% if the value of the net benefits were to be 20% lower than projected.

Conclusion, Recommendations, Loan Conditions

41. The proposed project would support the Government's efforts to increase the output of high value crops so as to increase farm incomes and to use labor and the available resources more fully. This would assist in the achievement of the Government's objective of eliminating the urban-income gap and in improving the quality of life and standard of living in the rural areas in which nearly 50 percent of the population lives. As a result of the increase in population, rapidly rising per capita incomes and the high income elasticities associated with such foods, the demand for fruits and vegetables has been increasing rapidly. The incremental output from the proposed project will contribute to meeting this demand.

42. The following are the main loan conditions on which agreement was reached during negotiations:

(a) An agricultural economist, and two horticulturists specializing in green house vegetable production and sprinkler irrigation for orchards respectively, would be appointed and in position within three months following Loan effectiveness (para 33);

(b) Participating Kun Cooperatives would meet the conditions specified in para 34;

(c) Subloan repayment periods would not exceed those indicated in para 38; and

(d) Conditions of Loan effectiveness would be the execution of agreements between the Government and NACF, and NACF and the PKCs which are acceptable to the Bank and covering project lending terms and conditions indicated in para 38.

43. Since the proposed project is basically a continuation of the First Project, which has been implemented effectively and on schedule, there are no major risks inherent in it. However, a greater degree of supervision and monitoring of project implementation will be necessary in view of the introduction of lending for new types of sub-projects. To this end, NACF's TU is to be strengthened by the addition of three technical officers (para 42).

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

A. BANKING AND AGRICULTURAL CREDIT

Financial Institutions

1. The financial sector of Korea consists of the Bank of Korea, Deposit Money Banks, either commercial or specialized, and non-bank financial institutions. The Bank of Korea performs regular central banking functions including the control and supervision of commercial banks. Commercial banks receive funds mainly from depositors. They are authorized to make various kinds of loans but have traditionally concentrated on short-term lending. The majority of shares in most commercial banks is held by the Government. Specialized Banks are directly controlled by the Ministry of Finance and, as their names imply, were founded for particular purposes such as small scale industry financing or agricultural financing. Their major source of funds is loans, primarily from the Government.

2. Commercial banks consist of: (a) six banks with a nationwide network of 412 branches; (b) ten local banks each with a smaller area of operation approximately the size of a province and a network of 184 branches; and (c) eight branches of foreign banks. Specialized banks include the Citizens National Bank (mainly for mobilizing small savings and financing household loans), the Medium Industry Bank, the Korea Housing Bank, Korea Development Bank, Korea Exchange Bank, the Central Federation of Fisheries Cooperatives and the National Agricultural Cooperative Federation (NACF).

3. Apart from insurance companies and the postal savings system, non-bank financial institutions consist principally of: (a) the Korean Development Finance Corporation (KDFC) for medium- and long-term financing of the industrial and transportation sectors; (b) the Korean Investment Corporation (KIC) which acts primarily as a broker on the Korean capital market; (c) the Korea Investment and Finance Corporation (KIFC) which provides short-term finance to the private industrial sector; and (d) the Agriculture and Fishery Development Corporation (ADFC), a Government-owned agency which takes equity participation and provides long- and short-term loans to agro-industries. AFDC also owns five manufacturing companies engaged in food and silk processing.

4. In coordination with monetary and credit policies of the Government, the Bank of Korea imposes reserve requirements for all Deposit Money Banks. Since 1971, the reserve requirement ratios have been fixed at 16% for time deposits and 19% for demand deposits. Corresponding ratios for NACF and Kun Cooperatives, however, are 13% and 16% respectively. This preferential reserve ratio has been established as a means to increase the transfer of urban savings mobilized by NACF and the Kun Cooperatives for agricultural production purposes. The Bank of Korea is also an important supplier of short-term funds at subsidized interest rates for NACF's credit and non-credit operations (see Chapter C).

Agricultural Credit

5. Sources of Agricultural Credit - NACF has a virtual monopoly in the provision of institutional credit to farmers. The commercial banks and AFDC provide neglible amounts of such credit. The contribution of NACF and its cooperatives to the supply of credit and other services for agriculture has been expanding rapidly. Loans granted to farmers by NACF and the Kun Cooperatives increased from W 222 billion in 1971 to W 449 billion in 1974 (the agricultural cooperative system in Korea is described in Chapter C).

6. According to a survey carried out by the Ministry of Agriculture and Fisheries (MAF), the average total borrowings of farm households in 1974 stood at about W 26,091 against average total assets of W 3,226,596. Of the total borrowings, W 5,378 (21%) originated from cooperatives and other public organizations, W 19,558 (75%) from individuals, and W 1,155 from other sources. The application of these borrowed funds shows that agricultural production purposes accounted for about 50%, with the balance going to living expenses, ceremonies, education, etc. Of the borrowings of W 12,929 used for agricultural production purposes, about 31% were supplied by agricultural cooperatives and other public institutions, and 64% by private individuals. The purchase of land accounted for 37% of the private loan funds used for agricultural production purposes, while cooperative funds for such purposes were negligible. This analysis shows that for agricultural production purposes, high interest loans from private sources were twice as important as credit from institutional sources. These private funds, however, were mainly used for purposes which agricultural cooperatives do not normally finance, such as the purchase of land. For non-productive purposes (living expenses, ceremonies, education, etc.) credit from private lenders is the main source of funds.

Sources and Uses of Farm Household Borrowings in 1974
(in Won)

Sources of Funds	Agricultural Production Purposes: Land Purchases	Agricultural Production Purposes: Others	Other Purposes	Total
Cooperatives and Public Organizations	234	3,801	1,343	5,378
Individuals	3,093	5,232	11,233	19,558
Others	178	391	586	1,155
Total	3,505	9,424	13,162	26,091

7. Interest rates charged by private money lenders are reportedly as high as 3 to 6% per month. The MAF survey mentioned above shows that average interest payments per household in 1974 were W 5,872 or 22.5% of the average total borrowings of W 26,091 (which include borrowings from cooperatives at rates of 9 to 12% per annum).

Interest Rates

8. Deposits - Interest rates on deposits of banking institutions have been adjusted from time to time but remained at relatively high levels since 1965 when an interest rate reform was adopted as part of the monetary policy of the Bank of Korea aimed at checking inflation, promoting savings and stimulating the flow of funds into the organized banking system. Rates on deposits as of July 1, 1975 range from 6 to 15% per annum. In order to mobilize rural savings, the Primary Cooperatives of NACF pay interest rates on deposits which are slightly higher than other banking institutions, including the Kun Cooperatives. Interest rates on time deposits of NACF and other banking institutions as of July 1, 1975, were approximately 3% higher than in 1973:

Interest Rate on Time Deposits

		1973	July 1, 1975
1.	3 months	8.4%	12.6%
2.	6 months	10.8%	13.8%
3.	1-2 years	12.0%	15.0%
4.	Over 2 years	12.6%	15.0%

9. Loans - The rates of interest charged by NACF on its short-term loans to depositors and member cooperatives are the same as those charged by commercial banks (15.5% per annum). NACF's other lending operations for agricultural production purposes or for exports are subsidized with rates to the borrowers of 9% to 12% (3.5% for irrigation associations). Details of NACF's lending operations are given in Chapter C.

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

B. PROJECT COMPONENTS, COSTS AND FINANCING

1. Although comprising a relatively small share of total lending by NACF, the First Agricultural Credit Project (Credit 335-KO) constituted an important source of funding of the institution's medium and long-term lending for on-farm investments to expand production of fruits, vegetables, meat and other non-food grain crops and allowed NACF to play a major role in implementing Government programs for agricultural diversification. To NACF, the other important benefits of the First Project are the institutional strengthening of NACF and its Kun Cooperatives. With the experience and expertise in project implementation acquired under the First Project, NACF is now capable of undertaking an expanded credit operation for agricultural diversification. This is an appropriate development strategy which is accorded high priority by the Government (also see para 14). The proposed Project would be a continuation and expansion of the agricultural development program financed under the First Project. It would provide medium and long-term loans, through selected Kun cooperatives of NACF to about 7,900 farmers for investments in: (i) apple orchard development, (ii) silkworm rearing houses, (iii) sprinkler irrigation for orchards, (iv) greenhouses for vegetable production, and (v) on-farm storage for fruits. Except for greenhouses, the other subprojects were already financed under the First project. The Project would be a three-year lending program. It would be part of a high priority Government program to increase farm output and incomes through diversification and modernization of agricultural production. The Project also aims at making more efficient and fuller use of available agricultural resources, thereby enhancing the employment opportunities, productivity and incomes of participating farmers. Determination of Project size was based on estimates of farmer demand and the loan processing capacity of the lending institutions (Kun Cooperatives) over a three-year period. In making the determination, account was also taken of domestic consumption projections and export prospects of the Project output, and the availability of complementary resources.

Project Components 1/

Apple Orchard Development

2. This subproject would finance expenditures for the establishment of about 2,100 ha of apple orchard. Major investment categories would be for land clearing, preparation, levelling and terracing; orchard establishment, including improved planting materials, fertilizers, pesticides, and hired

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1/ Detailed features of project components are given in Chapter F.

labor; spraying facilities and other small hand tools. In newly established orchards it is usual to intercrop with peanuts, soybeans or other vegetables over the first few years until the area is sufficiently shaded over by the apple trees when this practice would no longer be feasible. Sub-project investments would include financing production inputs for the initial crop. Investments would average about W 1.74 million per ha.

3. Most of the apple orchards to be developed would range from one to two ha. They would be planted with improved varieties using about equal proportions of standard and dwarf rootstocks. Sub-loans would only be given for orchard establishment in soils considered suitable by the Institute of Agricultural Sciences in Suweon. Although sub-loans would be made to about 1,400 farmers in seven out of nine provinces, there would be a marked concentration of lending within the apple growing counties.

Silkworm Rearing Houses

4. This sub-project would provide improved silkworm rearing houses and equipment to enable sericulture farmers to expand production of cocoons. In addition to allowing the adoption of branch feeding of the silkworms, which is labor saving, the investment items, in permitting more effective environmental control, would also enable quality improvements in cocoon production to be obtained. The sub-project would also finance the first year's cost of improved inputs to existing mulberry plantings in order to raise the yields of mulberry leaves to provide sufficient feed for the expansion in silkworm rearing. The main purpose of this sub-project is to increase the productivity of sericulture production without the need to expand existing mulberry acreage.

5. Sub-loans would be made to about 3,500 sericulture farmers owning 0.35 ha or more of mulberry plantings in production. The typical sub-loan would finance an improved rearing house of about 20-25 pyongs (66-83 m^2) floor space, and equipment, the major items of which are pivot cocoon beds, wooden racks and trays for silkworms feeding, and a 2-wheel cart. The rearing capacity would be five cases of silkworms a crop, or 10 cases for the two-crop year. About 0.35 ha of improved mulberry plantings would provide sufficient leaves to feed the quantity of silkworms envisaged. Sub-project financing to improve the mulberry plantings would mainly be for fertilizers/manure, pesticides, and hired bullock power and manual labor. The typical sub-loan would involve investments of about W 1.14 million.

Sprinkler Irrigation for Orchards

6. Many existing orchards, especially those growing in rather sandy soils as on river bed land, and volcanic ash soils, suffer from insufficient soil moisture that would be available to the plants. This in turn retards the rate of tree growth and lowers the yields and quality of fruit production. Thus, apple orchards in areas of lower rainfall where near drought conditions

occur quite regularly during certain periods in the hot summer months, generally produce smaller fruit (reduced yields) with a high incidence of skin cracks and poorer coloring. Sprinkler irrigation would be the most appropriate to correct this problem, though surface irrigation would be helpful for some orchards. In recent years, some of these orchards have installed sprinkler irrigation and have experienced significant improvements in yields and fruit quality.

7. About 800 farmers, each owning 2 ha or more of producing orchard, would be given sub-loans under the sub-project. Orchards of less than 2 ha would normally be unable to justify the use of sprinkler irrigation and would therefore not qualify for participation. Eligible orchards would have conditions described above and have available supply of water sufficient for irrigation needs. Major investment items for a 2 ha orchard would include a concrete well about 6 m deep and 2 m wide, diesel engine of about 10 hp and pump, pipes and pipe fittings, sprinkler heads, and installation costs. Although some of the sub-loans would be made on pear and orange orchards most are expected to be made on apple orchards. Investments would average about W 2.65 million for a 2 ha orchard.

Greenhouses for Vegetable Production

8. In response to rising incomes, there is a rapidly growing demand for fresh vegetables grown in greenhouses during the cold months of the year. Existing greenhouses are inadequate and many are inefficient. Improved greenhouses to be provided under the sub-project would raise productivity and expand output to help meet this increasing demand for vegetables during the period concerned.

9. About 1,200 farmers would participate in this sub-project which would finance the cost of constructing and equipping improved greenhouses. Major investment items would include metal frames for the greenhouses; ventilating, heating and irrigation equipment and facilities; and incremental working capital required to produce the initial crop of vegetables. Investments would average about W 3.09 million for 0.1 ha of greenhouses, a typical size investment to be undertaken by the individual sub-borrower. Sub-loans would be made to farmers who are experienced in greenhouse production, and have easy access to important urban consuming centres.

On-Farm Storage for Fruits

10. Apple, pear and orange growers with storage facilities, who market only some of their production at harvest time and store the larger part of their output for sale over the following months, have been able to obtain prices and financial returns which are significantly higher than those received by growers who sell all their output at harvest time. However, the majority of the growers do not have storage, but many have begun to recognize the profitability to be derived from a more orderly marketing of their output through the use of storage. Accordingly, there is now an increasing demand for on-farm storage facilities by such growers.

11. About 1,000 sub-loans would be made under the sub-project for the financing of concrete storage buildings, wooden boxes for packing the fruits for storage, and ventilating fans. Although the capacity of the storage buildings would vary according to sub-borrowers' needs, the majority would have a floor space of about 20 pyongs (66 m^2) or a maximum storage capacity of about 30 tons of apples and pears or 20 tons of oranges. This capacity, involving an investment cost of about W 2.2 million, would provide sufficient storage for the majority of apple and pear growers with 1-2 ha and orange growers with 0.5-1.0 ha.

Cost Estimates

12. The total cost of the Project is estimated at about W 19,978 million (US$41.2 million), of which about 31%, or W 6,207 million (US$12.8 million) would be foreign exchange.

Project Cost Estimate

	W million			US$'000			% Foreign
	Local	Foreign	Total	Local	Foreign	Total	Exchange
Apple Orchard Development /a	2,702.9	949.7	3,652.6	5,573	1,958	7,531	26
Silkworm Rearing Houses /b	2,821.5	1,152.4	3,973.9	5,818	2,376	8,194	29
Sprinkler Irrigation for Orchards /c	1,166.0	954.0	2,120.0	2,404	1,967	4,371	45
Green Houses for Vegetable Production /d	2,449.7	1,261.9	3,711.6	5,051	2,602	7,653	34
On-farm storage for Fruits /e	1,654.5	551.5	2,206.0	3,411	1,137	4,548	25
Subtotal	10,794.6	4,869.5	15,664.1	22,257	10,040	32,297	31
Price Contingency	2,976.7	1,337.4	4,314.1	6,137	2,758	8,895	—
Total	13,771.3	6,206.9	19,978.2	28,394	12,798	41,192	31

/a 2,100 ha.
/b 3,500 rearing houses (each of 20-25 pyong floor space), rearing implements, and improved inputs for 3,500 mulberry holdings each of about 0.35 ha.
/c For 1,600 ha of producing orchard.
/d 120 ha.
/e 1,000 storage buildings, averaging about 20 pyongs storage per building.

13. Detailed cost estimates are shown in Chapter G. Estimates are based on prices prevailing at time of appraisal (November 1975), including the costs of installation. A price contingency of 28% had been added to Project costs. The contingency is based on the projected price increases on the estimated amounts that would be disbursed. 1/

Financing

14. The total Project cost would be financed as follows:

Source	Amount (US$ million)
IBRD	20.0
Government	8.8
Subborrowers	12.4
	41.2

Of the total estimated Project cost, about 50% would be financed with proceeds from the proposed IBRD loan (US$20.0 million), including the foreign exchange component of US$12.8 million and some 25% of the local currency component. The Government will finance about 20% and subborrowers 30% of the total Project cost. This Project has a number of features which justify the proposed provision of local cost financing in an amount of about US$7 million. The Government is placing increasing emphasis on the diversification and expansion of agricultural production into high value foods and other non-foodgrain commodities, since it will lead to the more productive use of Korea's scarce agricultural resources. As such, the Government's efforts in this direction deserve IBRD's support to the fullest extent possible. NACF, which is the implementing agency and the primary source of agricultural credit in the country, is playing a major role in the implementation of this strategy.

1/ Projected price increases of 15% for 1976 and 10% for 1977 and 1978.

KOREA

SECOND AGRICULTURAL CREDIT PROJECTS

C. BORROWING AND EXECUTING AGENCIES

1. The IBRD loan would be made to the Government which would lend the proceeds of the loan and its share of Project costs to NACF for on-lending by NACF's network of Kun Cooperatives to subborrowers. Project lending terms and conditions for the parties concerned are given in Chapter D. The Technical Unit (TU) and Project Coordinating Committee established under the First Agricultural Credit Project would also be involved in implementing the proposed Project as described below.

The National Agricultural Cooperative Federation

2. Established in 1961, NACF fulfills a dual closely integrated role. As the apex organization of a three-tier agricultural cooperative structure in Korea, it supervises and coordinates the operations of its member cooperatives, which comprises Kun (county) Cooperatives at the intermediate level, Primary Cooperatives at the village level, and Special Cooperatives for horticulture and livestock farmers (organizational structure is shown in Chart 15623 below). NACF also functions as an instrument for the implementation of national agricultural policies. It is partly in pursuance of this responsibility that NACF undertakes a variety of credit and non-credit activities, including the distribution of agricultural inputs and supplies, marketing, banking, mutual insurance, guidance and training. In all these operations, NACF receives considerable financial support from the Government.

3. NACF recently embarked on a major reorganization of the cooperative structure. To be completed in 1977 it would involve a reallocation of functions between the Primary and Kun Cooperatives whereby all short-term production credit and non-credit activities would be undertaken by the 1,545 Primary Cooperatives while the Kun Cooperatives would handle medium and long-term credit and exercise audit functions over the Primary Cooperatives on behalf of NACF.

Primary Cooperatives

4. The Primary Cooperatives have about 1.9 million member farmers and are multi-purpose in their functions. They have a minimum membership of 20 farmers and an area of operation of one or several villages. There were about 16,000 such cooperatives in 1968. Since then NACF has been pursuing a consolidation program of the Primary Cooperatives into larger, more economical units. This merger program was completed in 1972 and NACF now sponsors 1,545 Primary Cooperatives throughout Korea. Although legally separate from NACF and the Kun Cooperatives, the Primary Cooperatives are an essential instrument for the implementation of NACF's credit and non-credit operations. The

functions of the Primary Cooperatives include storage and distribution of consumer goods and agricultural inputs, collection and storage of agricultural products, distribution of short term production loans as well as technical guidance and general welfare activities.

5. Most of the Primary Cooperatives also operate a Mutual Credit scheme through which they mobilize the savings of their farmer members and make short-term loans to their depositors for miscellaneous purposes. This mutual credit system was initiated in 1969 in order to reduce usury financing and has made good progress with deposits of ₩ 57,918 million and outstanding loans of ₩ 34,237 million at the end of December 1974. The unused portion of the mobilized funds is deposited with the Kun Cooperatives and channelled to NACF for financing its banking operations. Another source of funds of the Primary Cooperatives is their share capital. Each member farmer must own at least one share (₩ 1,000) but has one voting right irrespective of his share capital. Part of these funds is utilized by the Primary Cooperatives for their own subscriptions to the share capital of Kun Cooperatives which in turn subscribe to NACF's capital.

6. NACF has initiated a "self-support" program for the Primary Cooperatives. To be completed by 1977, the program provides for the training and strengthening of the management of the Primary Cooperatives, and also aims at a reallocation of tasks between the Primary and Kun Cooperatives which will further expand the functions of the Primary Cooperatives (see para 8). At present 735 of the 1,545 Primary Cooperatives are considered as "self-supporting" by NACF.

Kun Cooperatives

7. The 140 Kun Cooperatives with their 211 branches function at the intermediate level of the three-tier cooperative structure. NACF and Kun Cooperatives are distinct legal and financial entities but are closely integrated in regard to management, resource mobilization and lending operations. The Kun Cooperatives handle NACF's credit and non-credit activities at the county level and act as a channel of funds to their member Primary Cooperatives.

8. Non-credit activities represent a large part of the operations of the Kun Cooperatives. NACF, however, plans to delegate more of these activities to the Primary Cooperatives in the frame of the "self-support" program. The Kun Cooperatives would then assume a role of auditing and supervising the operations of the Primary Cooperatives and in addition would concentrate on banking type operations, such as mobilization of deposits and provision of agricultural development loans. The Kun Cooperatives already are playing an important role in mobilizing deposits of which approximately 30% are utilized for short-term commercial loans, 20% kept in reserves and the rest transferred to NACF to support its operations. With deposits of ₩ 201,380 million at the end of 1974 of which less than 20% were from farmers, the Kun Cooperatives are effectively able to mobilize urban savings for the financing of NACF's agricultural activities.

9. As under the First Agricultural Credit Project, Kun Cooperatives should meet the following conditions before they would be allowed to participate in the proposed Project:

(i) Overdues at the end of the preceding financial year would not exceed 10% of the loans outstanding.

(ii) The Kun Cooperatives should have at least one Loan Appraisal Officer (LAO) working full time on Project loans and more would be provided commensurate with increases in the work load. LAOs would be trained by the TU.

(iii) Adequate extension support for Project farmers would be provided.

Special Cooperatives

10. The Special Cooperatives are organized outside the three-tier structure on the basis of commodities handled rather than geographical jurisdiction. There are 45 horticulture and 97 livestock cooperatives organized for the purpose of promoting the production, processing and marketing of specific commodities in areas in which there is a concentration of production. They have about 57,000 member farmers who may also be members of Primary Cooperatives. Special Cooperatives are members of NACF. They are also associate members of the Kun Cooperatives in their area. Services provided by the Special Cooperatives include the supply of inputs, marketing, and processing of agricultural products. Their operations are controlled and financed by NACF.

11. The Sericulture Associations fulfill a similar role for sericulture farmers but with more emphasis on the provision of extension work. They have a farmer membership of about 4,700. Although not presently integrated with NACF, they work closely with the local cooperatives.

Organization

12. Management - The General Assembly of NACF is the representative body of the member cooperatives (Kun and Special Cooperatives). The Representatives Meeting elected by it approves NACF's annual business plan, budget and accounts. The Administration Board, the policy-making body of NACF, consists of the President of NACF (appointed by the President of the Republic of Korea), representatives of the Ministries of Agriculture and Finance and the Bank of Korea, and five delegates elected by the Representatives Meeting. The President of NACF is assisted by an Executive Vice-President. Six Vice-Presidents supervise the various departments (see Chart 15622 below).

13. Staff - NACF has a staff of approximately 2,100 of whom about a third are professionals. NACF's Agricultural Cooperative College offers a two-year training course in agricultural cooperation. Many of its graduates are employed by NACF and its member cooperatives. NACF also operates two other training institutions, the Saemaeul Leaders Training Institute for farm leaders and the Cooperative Training Institute for its own cooperative staff.

14. Non-Credit Functions - NACF's non credit activities are as follows:

(a) Distribution of Agricultural Inputs and Supplies - Sales of fertilizer, chemicals and agricultural machinery are made at subsidized prices and on credit.

(b) Marketing - NACF collects farm products through the Kun, Special, and Primary Cooperatives and sells by auction in the 20 marketing centers it operates in the major cities. NACF also purchases certain crops under a Government program and is engaged in agricultural processing, including the manufacture of animal feeds. In addition, NACF operates a Government sponsored price stabilization scheme through purchases and storage of a limited number of agricultural products. These operations are financed from credit provided by the Bank of Korea and Government funds.

(c) Insurance - NACF's insurance activities have grown rapidly and include life and damage insurance. This business has proved very profitable (para 26).

(d) Other Activities - NACF is involved in a variety of other activities such as foreign trade of agricultural products, warehousing, and production of fertilizers.

15. Credit Functions - NACF makes short, medium, and long-term loans for agricultural and non-agricultural purposes to member cooperatives, agricultural associations, agricultural processing industries and individuals. Terms and conditions vary with the purpose and source of funds and are strictly controlled by the Government (see Table C-4). Medium and long-term loans are made by the Kun Cooperatives. Short-term financing of agricultural inputs is handled by Primary Cooperatives. Agricultural loans are mainly financed from Government and Bank of Korea funds, and NACF's own resources. Short-term commercial loans to depositors and cooperatives are made from deposit resources. Loans advanced by NACF and Kun Cooperatives grew from ₩ 222 billion in 1971 to ₩ 449 billion in 1974 and outstanding loans during the period rose from ₩ 123 billion to ₩ 252 billion. Details of loans granted and outstanding by purpose and sources of their funding are given in Tables C-1 and C-2.

Lending Operations

16. Types and Terms of Loans - According to their purpose, NACF loans are in four categories:

(a) Agricultural Loans - (i) Long-term loans have been granted mainly to irrigation associations at 3.5% interest per annum from funds provided by the Government. (ii) Medium-term loans at 9% interest per annum are made either from

NACF's own resources or directly from Government budgetary funds lent to NACF at 5% per annum. The Government gives to NACF an interest subsidy equivalent to 6.5% when its own deposit resources are utilized which could otherwise be lent for commercial purposes at 15.5% interest. (iii) Short-term loans are granted at 12% per annum for financing agricultural inputs. About two-thirds of these funds come from NACF's own resources and the remaining one-third through borrowings from the Bank of Korea at 6% interest per annum.

(b) Loans to Primary and Special Cooperatives - Medium-term loans at 9% are made for the construction of storage and other facilities from Government funds lent to NACF at 2% per annum. Short-term working capital loans are also granted at 15.5% from deposit resources.

(c) Agricultural Processing and Export - Short-term loans at 9% interest per annum are granted for the purchase of agricultural raw materials for export, with funds from credits provided by Bank of Korea.

(d) Commercial Loans - Short-term loans are granted to depositors as a normal banking service at a rate of 15.5% per annum. Such service is essential to the mobilization of urban deposits for which NACF must compete with other commercial banks. The deposits represent an important source of funds for NACF.

17. Loan Collection - Collection records are satisfactory. The arrears position has gradually improved and the amount of loans overdue was lower at the end of 1974 than in 1971, despite a rapid increase in credit operations during the period. The ratio of arrears to outstanding loans was 4.1% at the end of 1974. Details are shown in Table C-3.

18. Credit Guarantee Fund - Established by NACF in 1972 for borrowers with insufficient collateral, this Fund is financed from a fee of 0.5% per annum charged to the borrowers, a Government grant and reserves set aside from annual profits.

Lending Procedures

19. Lending procedures vary with the origin of the funds, the purpose of the loans and the types of borrowers. The Ministry of Agriculture and Fisheries (MAF) can have a direct influence on the selection of eligible borrowers when these are agricultural development organizations, cooperatives, farming groups, the Kun, Primary and Special Cooperatives. The Bank of Korea plays the same role for the funds it loans to NACF on short-term for the financing of agricultural processing enterprises. NACF lends directly to the cooperatives for their working capital or facilities, and channels Government

funds to the farmers through the cooperative system. Loans to farmers for productive purposes are made either from Government funds earmarked for such purposes, or from NACF's own banking funds. Since available funds often fall short of meeting the credit demand, NACF in consultation with MAF makes quarterly allocations by province and county. At the cooperative level, a Loan Committee selects eligible borrowers. This committee consists of the President of the cooperative, the chief of the Kun or county (or village in the case of Primary Cooperatives), the head of the local Office of Rural Development and at least two farmers. For medium-term production loans which are exclusively handled by Kun Cooperatives, an appraisal of the investment is carried out before a loan can be sanctioned. In the case of short-term production loans for the financing of agricultural inputs (partly funded by the Bank of Korea) no appraisal is made and the loan committee of the Primary Cooperative must reconcile the needs of individual farmers with the allocation available.

20. As part of the instructions issued by NACF's Loan Appraisal Department, cooperatives are required to keep a list of all the member farmers with information concerning their resources, production, sales and credit record. This information is used to determine the loan eligibility of borrowers. Short-term production loans are made under the personal guarantee of each borrower with one or two co-guarantors. Other production loans are secured by mortgages on land and fixed assets. Chattel mortgages are taken on livestock, machinery and equipment.

21. Powers of loan sanction have been increasingly decentralized by NACF. Primary Cooperatives can approve loans up to W 300,000. Kun Cooperatives and Provincial Branch Offices are limited to ceilings of W 7 million and W 10 million respectively. Loans for more than W 10 million must be approved by the President of NACF.

Resources

22. As of the end of 1975, NACF's total resources amounted to W 663.9 billion as follows:

	(In W million)
Share Capital, Unappropriated Earnings and Reserves	10,413
Borrowings from Government	70,060
Foreign Loans	24,416
Borrowings from Bank of Korea	187,951
Deposits	367,753
Agriculture and other Bonds	3,309
Total	663,902

23. Borrowings from Government comprise loans from budgetary funds made available to NACF at 2% to 5% interest per annum. Borrowings from the Bank of Korea at interest rates varying from 2% to 6% are used for financing NACF's fertilizer operations, purchase and export of agricultural products, and credit sales of agricultural inputs. Deposit resources represent an increasingly large share of NACF's total resources. Savings are mobilized from farmers by the Primary Cooperatives under the Mutual Credit Scheme and from urban depositors by the Kun Cooperatives and NACF. Excess deposit funds after allowance for legal reserves and commercial loans are ultimately transferred to NACF for the financing of its banking operations (see Chapter A para 4). Interest rates paid on time and savings deposits are fixed by the Government. They range from 12.6% to 15%.

Financial Condition

24. Basis of Accounting - As is conventional in most other financial institutions in Korea, NACF states its income on an actual receipts basis and expenses on an accrual basis in its annual accounts. As a result income accrued and receivable is not shown as an asset and undistributed profits are understated. NACF's and Kun Cooperatives' balance sheets and income statements on cash-cum-accrual basis of accounting appear in Tables C-5, C-6, and C-7. NACF's audited accounts appear in Tables C-8 and C-9. The accounting system also does not provide for a clear allocation of administrative costs among the various activities and departments. However, measures to improve the accounting and financial reporting systems would be implemented in the near future (para 27).

25. Equity. At the end of 1975 NACF's equity was as follows:

	(in million Won)
Paid-in Capital	3,725
Capital Surplus	417
Reserves	767
Unappropriated earnings	5,504
	10,413

Although NACF's equity is small in relation to its total borrowings, this should not be of concern since the majority of the borrowings comprise funds provided by the Government and Bank of Korea for the implementation of Government directed programs (para 2, 16, and 23). NACF has also been pursuing efforts to increase subscriptions to its share capital by the Kun Cooperatives. By the end of September 1975, total subscriptions of the Cooperatives amounted to ₩ 2,943 million or 2.7% of their outstanding borrowings from NACF.

26. Financial Performance. NACF's audited accounts show the following breakdown of its profits:

	(in million Won)		
	1973	1974	1975
General Business Department	-1,277	-2,149	-1,653
Banking Department	644	-47	960
Insurance Department	1,075	3,146	2,511
Total net income	442	950	1,818

The losses of the General Business Department were reportedly due to the expansion of NACF's non-profitable activities (such as the supply of fertilizers and chemicals) and the overall increase in their procurement costs following the energy crisis. NACF's auditors pointed out that the rate of losses to revenues showed a reduction from 0.9% in 1973 to 0.4% in 1975. As for the losses of the Banking Department in 1974 the explanations are:

(i) Effective January 24, 1974, the interest rates payable by NACF on time deposits increased substantially while the rates applied to loans remained unchanged thus reducing NACF's margin.

(ii) The devaluation of the Won in December 1974 resulted in a foreign exchange loss of ₩ 106 million in 1974. In 1973 a foreign exchange gain of ₩ 198 million had been recorded.

(iii) The 1973 accounts showed as revenues interest receivable on the total outstanding loan balance, including the doubtful accounts. In 1974, however, uncollectable loans were identified separately from doubtful accounts and accrued interest on uncollectable loans was not included in the revenues.

While the explanations for the losses incurred by the Banking Department in 1974 seem reasonably substantiated, it appears that the General Business Department should keep a closer control on its costs and obtain appropriate compensation from the Government for the losses incurred from operations undertaken at the insistence of the Government (para 27).

Accounts and Audit

27. Although NACF maintains separate accounts for all its organizational units and major activities, not all the accounts are sufficiently comprehensive or independent, nor are they recorded in a manner which will allow NACF to obtain accurate and appropriately detailed financial statements for each of its activities. Furthermore, accounting functions are handled by various departments entailing unnecessary duplication of work. The main purpose of the Management Study provided for in the First Project is to correct this

major weakness in NACF's accounting and financial reporting systems. The Study was completed in December 1975. Major recommendations include: (i) the need to measure and value services of centralized service departments and to charge the cost of such services to other departments which use them; (ii) introduction of an accounting code structure which will allow all departments and activities to maintain independent accounting records; and (iii) creation of a consolidating accounting function to reconcile and eliminate duplication of transactions, and to prepare activity and other formal financial statements at each organizationsl level and for NACF as a whole. Systems to implement these recommendations which were developed under the Study are being tested using a number of selected departments. Implementation of the systems, to be phased over several months, is expected to provide NACF with, inter alia, independent financial and accounting statements by department and major activity. This will also provide NACF with a proper basis to seek appropriate compensation from the Government for the losses incurred in the implementation of Government directed programs.

28. As required under the First Project, NACF's accounts have been auditied by independent auditors acceptable to IBRD. The audit had been satisfactory. This requirement would be maintained under the proposed Project. NACF would maintain a separate Project account which would be audited annually and sent to IBRD, together with a copy of the audited balance sheets and income statements covering its total operations within four months after the close of each financial year. NACF would also forward to IBRD quarterly reports covering the Project's progress within two months following the end of each quarter.

The Technical Unit

29. Under the First Agricultural Credit Project, a Technical Unit (TU) was set up by NACF in 1973 to supervise and monitor Project implementation. A Project manager, at the section chief level, is heading the TU and is responsible to the head of the Foreign Loan Office who, in turn reports to one of the six Vice-Presidents of NACF. The TU has performed satisfactorily under the First Project.

30. While individual loans under the First Project are appraised and disbursed by the Kun Cooperatives, the TU supervises their project loan operations, including the provision of technical advice and training the Loan Appraisal Officers of the Cooperatives in proper appraisal and supervision. The TU is also responsible for monitoring the project in all its aspects.

31. No substantial change in the functions of the TU would be necessary to implement the proposed Project. However, assurance should be obtained from NACF that a Kun Cooperative would be allowed to participate in the Project only when the TU is satisfied that adequate extension support would be available to its Project farmers. The TU shall further ensure that the extension services are satisfactory and adequate through frequent visits to the Cooperatives and to the Project subborrowers.

32. At present, the TU consists of a Manager, two Assistant Managers, two horticulturists, two experts each in sericulture and livestock, and administrative support staff. Under the proposed Project, the TU would be strengthened by the inclusion of at least three additional technical staff comprising an agricultural economist, and two horticulturists specializing in green house vegetable production and sprinkler irrigation for orchards respectively. The agricultural economist would be mainly responsible for the financial and economic aspects of the Project, including training Loan Appraisal Officers in proper appraisal which at present is done essentially by the Manager. One of the Assistant Managers would be in charge of administration, and the other would handle Project matters, including training. The three additional technical staff would be appointed and in position within three months following Loan effectiveness.

33. In order that the TU would be able to retain its technical experts, especially those who are experienced and whose services are therefore essential to the effective and timely implementation of the Project, it is proposed that these officers, when promoted, would continue to remain with the TU and would not be transferred out as is the present practice. The turnover of the technical staff which had some disruptive effect on the TU's work under the First Project would accordingly be minimized.

34. The present TU Manager is a junior officer (section chief) when compared with the officials of other NACF and Government departments whom he has often to deal with on matters concerning the First Project. Consequently, his dealings with the officials concerned had not been as effective nor expeditiously dealt with. To correct this shortcoming, it is suggested that the TU Manager's position under the proposed Project be upgraded to that of a Department Deputy Manager level.

Project Coordinating Committee

35. A Project Coordinating Committee was established under the First Agricultural Credit Project to ensure coordinated planning and execution of project operations between NACF and other Government agencies. Constituted under the Chairmanship of the Vice President of NACF responsible for the Project, the Committee included representatives of MAF, Office of Rural Development, Economic Planning Board, Ministry of Finance, and Agricultural Development Corporation (ADC), with the Project Manager (para 29) as its secretary. The Committee assumed the following responsibilities:

(a) coordinate project investments with related Government programs;

(b) assure cooperation of administrative and technical extension staff of MAF and ADC; and

(c) review progress, identify difficulties and recommend measures to remove obstables to project execution.

36. Meeting at regular intervals, the Committee had played an important role in the timely and effective implementation of the First Project. In view of this, it is suggested that the Committee be maintained to carry out a similar role under the proposed Project.

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SECOND AGRICULTURAL CREDIT PROJECT

Outstanding Loans of NACF and Kun Cooperatives by Source of Funds and Purpose
(in million won)

December 31,	1970	1971	1972	1973	1974	1975 1/
From Banking Funds						
I. Agricultural Loans						
a. Short-term Production	5,729	7,990	13,387	11,814	14,098	24,825
b. Medium-term Production and Equipment	17,215	21,611	23,931	26,059	31,594	35,504
c. Short-term Loans to Institutions	5,002	7,795	8,465	10,111	20,024	21,066
d. Other Short-term Agricultural Loans	9,224	8,336	8,435	10,532	17,612	15,178
e. Usury Debt Settlement (Medium-term)	1,521	1,474	761	720	677	672
Total Agricultural Loans	38,691	47,206	54,979	59,236	84,005	97,245
II. Short- and Medium-term Fishery Loans	4,634	5,134	4,024	4,228	5,222	6,118
III. Other Short-term Loans						
a. Export Loans	2,404	4,334	5,804	6,760	40,575	41,343
b. Trade	1,830	1,305	1,015	3,756	1,133	2,621
Total Other Short-term Loans	4,234	5,639	6,819	10,516	41,708	43,964
IV. Savings Promotion Loans						
a. Commercial Loans	13,069	17,482	23,575	27,102	36,335	37,481
b. Others	10,360	12,187	9,627	11,962	20,479	20,451
Total Savings Promotion Loans	23,429	29,669	33,202	39,064	56,814	57,932
V. Agricultural Machinery Industry	-	-	-	-	269	265
VI. Long-term Credit Debentures	-	-	3,960	3,850	3,264	3,220
Total Banking Fund Loans	70,988	87,648	102,984	116,894	191,282	208,744
From Budgetary Funds						
I. Counterpart Funds						
a. Agricultural Modernization	1,177	2,734	2,532	2,148	1,758	1,747
b. Assistance to Primary and Special Coops	822	510	1,415	1,159	1,206	1,325
c. Other Agricultural Loans	118	102	97	90	83	83
Total Counterpart Funds	2,117	3,346	4,044	3,397	3,047	3,155
II. Budgetary Operations Funds						
a. Agricultural Production	2,963	4,124	4,948	4,147	3,546	3,490
b. Rural Development	412	320	279	222	158	150
c. Special Crops	9,074	10,101	11,691	12,716	12,840	13,462
d. Others	349	506	5,218	5,557	9,198	8,180
Total Budgetary Operations Funds	12,798	15,051	22,136	22,642	25,742	25,282
III. Agricultural Price Stabilization	1,931	1,473	1,194	1,037	1,319	673
IV. Long-term Irrigation Loans	13,664	11,778	14,164	16,029	17,906	20,231
V. Foreign Loans	3,791	3,772	3,723	4,401	5,063	11,513
VI. National Investment Fund	71	-	-	-	7,790	15,717
Total Budgetary Fund Loans	34,372	35,420	45,261	47,506	60,867	76,571
GRAND TOTAL	105,360	123,068	148,245	164,400	252,149	285,315

1/ As of June 30.

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SECOND AGRICULTURAL CREDIT PROJECT

Purposewise Analysis of Loans Granted by NACF and Kun Cooperatives During each year
(in million won)

		1971	1972	1973	1974
I.	Agricultural Loans				
	a. Long-term (irrigation)	3,403	2,819	2,287	2,463
	b. Production and Farmers Increased Income Progress				
	(i) Medium term	13,837	18,653	14,982	29,062
	(ii) Short term	19,855	23,995	51,910	101,454
	c. Agricultural Machinery and Modernization	1,992	3,418	938	132
	d. Other Agricultural Loans	4,813	5,236	1,095	594
	Sub-Total	43,900	54,121	71,212	133,705
II.	Fostering of Special and Primary Coops				
	a. Short-term (operation)	5,147	4,682	10,378	15,504
	b. Medium-term (facilities)	1,998	3,210	483	5,143
	Sub-Total	7,145	7,892	10,861	20,647
III.	Agricultural Marketing	3,331	3,882	5,094	5,034
IV.	Export Preparation and Foreign Trade (Short-term)	22,645	29,804	51,409	88,450
V.	Fishery Loans				
	a. Short-term (operation)	18,364	17,324	16,059	33,631
	b. Medium-term (facilities)	1,724	-	-	-
	Sub-Total	20,088	17,324	16,059	33,631
VI.	General Commercial Loans	125,303	131,400	126,640	162,018
VII.	Special Long-term Loan for Improvement of Farm Enterprises	-	5,654	6,052	5,549
	Total	222,412	250,077	287,327	449,034

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SECOND AGRICULTURAL CREDIT PROJECT

Collections and Overdues of NACF and Kun Cooperatives
(in million won)

	NACF 1/				Kun Cooperatives				NACF and Kun Cooperatives			
	1971	1972	1973	1974	1971	1972	1973	1974	1971	1972	1973	1974
1. Loans outstanding of the beginning of the year	39,094	39,957	45,173	50,318	66,267	83,112	103,072	114,083	105,360	123,068	148,245	164,400
2. Loans advanced during the year	76,779	98,918	124,653	224,148	145,633	151,159	162,674	224,886	222,412	250,077	287,327	449,034
3. Loans recovered during the year	75,916	93,702	119,508	178,710	128,788	131,199	151,663	182,576	204,704	224,900	271,171	361,285
4. Loans outstanding at the end of the year	39,957	45,173	50,318	95,756	83,112	103,072	114,083	156,393	123,068	148,245	164,400	252,149
5. Loans overdue at the end of the year	2,775	2,231	1,787	1,657	8,604	9,344	7,957	8,755	11,376	11,575	9,744	10,412
6. Proportion of 5 to 4	6.9%	4.9%	3.6%	1.7%	10.4%	9.1%	7.0%	5.6%	9.2%	7.8%	5.9%	4.1%

1/ Figures exclude loans from NACF for supporting Kun Cooperatives and their business

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ANNEX C
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Table C-3

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SECOND AGRICULTURAL CREDIT PROJECT

Types and Terms of NACF Loans By Source of Funds

A. BANKING FUNDS	Purpose	Project Sponsor	Eligible Borrowers	Selecting Agency	Lending Terms: Interest Rate	Lending Terms: Total Repayment period	Lending Terms: Grace Period	Remarks
I. Production and Equipment (GOK subsidized operations)								
1. Sericulture	Silk worm rearing houses for collective use	MAF	Farming groups, Sericulture Association, Primary Coops	Loan Committee	9%	8	2	NACF receives from Government an interest subsidy of 6.5% (15.5% - 9%) as a compensation for using its own funds which could otherwise be lent at 15.5%.
2. Mushroom	Rearing houses, seeding materials, chemicals	MAF	Farmers	Loan Committee	9%	2 to 8	up to 2 years	
3. Green Houses	Vinyl green houses	MAF	Farmers	Loan Committee	9%	8	3	
4. Grass Fields	Fencing of grass fields	MAF	Farmers	Provincial Governor	9%	8	3	
5. Feed Supply	Buffer stocks	MAF	Agricultural Coops and Feed Producers	NACF	9%	4 months		
6. Rural and Fishery Area Development, Saemaul Movement.	Side-line production	MAF	Farming groups	MAF	9%	5	2	
7. Warehouses	Construction of Warehouses	MAF	NACF Marketing Centers	MAF	9%	10	5	
8. Mutual Credit	Assistance to Primary Coops	MAF	Primary Coops	NACF	9%	8	Lump sum repayment	
9. Farm Mechanization	Sprayers, Pumps, Tillers	MAF	Farmers, local organizations	Kun Coops	9%	3 to 9	No grace	
10. Shiitake	Purchase of Logs	Forestry Office	Farmers	Loan Committee	9%	5	2	
11. Export	Collection and processing of Shiitake	Forestry Office	Forestry Coops	President of the Forestry Office	9%	5	2	
12. Fruit	Apple, Pears Orange, Persimmon	MAF	Farmers	Loan Committee	9%	12	7	
13. Tea and Herbs	Production of Tea and Herbs	MAF	Farmers	Loan Committee	9%	6	3	
14. Livestock	Korean cattle	MAF	Farmers	Loan Committee	9%	8	2	
15. Dairy Production	Milking machines, Marketing Centers	MAF	Livestock Special Coops, Farmers	Loan Committee	9%	8	2	
II. BOK Supported Operations								
Short-term Production Loans	Purchase of inputs	NACF	Farmers	Loan Committee	12%	1 year		From BOK at 6% per annum for 1 year, representing 30% to 40% of the total loans
Development of Agro-Industries	Processing of Agricultural Products	BOK	Enterprises	BOK	9%	1 year		From BOK at 3.5% for 1 year or less
Export Fund (Agricultural & Fishery Products)	Collection and storage of cocoons, mushrooms, lavers etc.	MAF	Enterprises	BOK	9%	180 days		From BOK at 3% per annum for 135 to 240 days.
Fertilizer Business	Storage of fertilizer	MAF	NACF Business Department	BOK	No on-lending			From BOK at 2% per annum for one year
III. Operations From NACF Own Funds Only								
Agricultural Enterprises and Associations								
1. Sericulture	Short-term needs	NACF	Federation of Forestry Coops, Sericulture and Mulberry Tree Association	NACF	15.5%	Short-term		
2. Farm Enterprises	Short-term needs	NACF	Farming Enterprises	Kun Coops	15.5%	1 year		
3. Irrigation	Short-term needs	NACF	Land Development Coops	NACF	15.5%	1 year		
4. Fishing	Short-term needs	Office of Fisheries	Fishing Enterprises	Fishery Associations	15.5%	1 year		
5. Primary Coops	Short-term needs	NACF	Primary Coops	Kun Coops	15.5%	1 year		
6. Special Coops	Short-term needs	NACF	Special Coops	NACF	15.5%	1 year		
Savings Promotion								
1. Teachers Welfare Association	Education fees, welfare	NACF	Teachers (depositors)	Welfare Associations	15.5%	1 year		
2. Loans on Installment Deposits	Personal loans	NACF	Depositors	Kun Coops	12 to 15.5%	2 years		
3. Commercial loans	Commercial	NACF	Depositors or potential clients	Kun Coops	15.5%	1 year		
4. Overdrafts	Clients	NACF	Checking Accounts	Kun Coops	17.5%	6 months or less		

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SECOND AGRICULTURAL CREDIT PROJECT

Types and Terms of NACF Loans By Source of Funds

								NACF Borrowing Terms		
B. GOVERNMENT FUNDS	Purpose	Project Sponsor	Eligible Borrowers	Selecting Agency	Interest rate to Borrowers	Total Repayment period	Grace Period	Interest Rate	Repayment Period	Grace
I. Irrigation and Land Development Fund										
Agricultural Irrigation Development and Assistance to Land Development Associations	Reservoir, Pumping Station, River Bed Development	MAF	ADC, Land Dev. Association	MAF	3.5%	35	5	2%	35	5
II. Counterpart Fund										
Farm Modernization and Facilities for Primary and Special Coops	Land reclamation, Machinery and storage facilities	MAF	Farmers, Primary and Special Coops	Kun Coops	9% 8% for storage	2 to 5 years	Variable	2% 5%	10 30	5 (from Government) 5 (from USAID)
III. Budgetary Funds										
a. Rural Development	Saemaul Movement	MAF	Farmers, Leading Farmers	MAF	Gratis	8 years or less	3 years or less	Gratis	10	5
b. Agricultural Production	Agricultural Production Increase (mainly for rice and barley)	MAF	Farmers	MAF	9%	5	2	5%	10	5
c. Forestry	Forestration	Office of Forestry	Farmers, Federation of Forestry Coops	Head of Forestry Office	9%	5	2	5%	10	5
d. Settlement of Agricultural High School and College Graduates	Livestock, Sericulture, Cash Crops	Ministry of Education	Agricultural College & High School Graduates	MAF	9%	5	2	5%	10	5
e. Leading Farmers Supporting Funds	Cash Crops and Farm sidelines	MAF	Leading Farmers	Leading Farmers Committee	9%	5	2	5%	10	5
f. Ginseng	Purchase & storage of Ginseng	Monopoly Office	Ginseng Cooperative Federation	Monopoly Office	9%	1	-	5%	10	5
g. Feed	Feed cutter installation	MAF	Farmers	Loan Committee	9%	5	2	5%	10	5
h. Tobacco	Construction of nursery beds and drying facilities	Monopoly Office	Tobacco Coops	Monopoly Office	9%	4 years & less	1	5%	10	5
IV. Fertilizer	Fertilizer Production and Utilization	MAF	Farmers, Producers	MAF	2%	10	5	2%	10	5
V. Farm Chemicals	Application and Storage	MAF	Farmers, NACF	MAF	Gratis	10	5	Gratis	10	5
VI. Price Stabilization Fund	Purchase & storage of farm products	MAF	Kun Coops ans Special Coops	MAF	Gratis for buffer stocks; 9% for purchase	9 months or less		5%	1	
VII. Special Forestry Fund	Reforestration	Office of Forestry	Federation of Forestry Coops, Kye & Ri-dong Coops		3% during grace 6% thereafter	35	15	1% during grace 2% thereafter	35	15
VIII. National Investment Fund through (BOK)										
a. Power fillers	Production of Power Tillers Purchase of Power Tillers	MAF MAF	Manufacturers Farmers	NACF Loan Committee	9% 9%	90 to 120 days 7	- No grace	7.5% 7.5%	8 8	No grace "
b. Slopeland	Slopeland Development	MAF	Provincial or County Governor	MAF	9%	8	3	"	"	"
c. Grass Land and Pasture	Grassland Development & Cattle Rearing Houses	MAF	Farmers	MAF	9%	8	3	"	"	"
d. Warehousing	Food Grain Storage	MAF	NACF and Coops	MAF	9%	8	3	"	"	"

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SECOND AGRICULTURAL CREDIT PROJECT

Condensed Balance Sheet of NACF
(in million won)

ASSETS	1970	1971	1972	1973	1974
CREDIT AND BANKING					
Cash	2,702	2,533	1,604	3,882	2,410
Deposit in Bank	8,760	5,306	13,361	24,016	20,677
Securities	52	67	114	136	175
Loans to Kun Cooperatives	42,356	59,240	70,612	95,104	147,864
Loans From Banking Funds	16,540	19,405	21,902	25,448	67,445
Loans from Budgetary Funds	18,916	16,916	19,637	21,239	24,073
Loans from Foreign Funds	3,638	3,636	3,634	3,631	4,238
Miscellaneous Claims	8,262	14,503	17,184	10,221	25,282
Sub-Total	101,226	121,606	148,048	183,677	292,164
MUTUAL INSURANCE					
Deposit	1,945	2,272	1,967	1,845	1,509
Loans	2,029	2,415	3,637	4,422	6,879
Fixed and other Assets	1,530	3,926	8,493	9,832	13,530
Sub-Total	5,504	8,613	14,097	16,099	21,918
BUSINESS					
Receivables and Advance Payments	12,700	17,617	19,490	26,156	53,725
Inventory	22,741	25,910	22,022	34,538	50,874
Fixed Assets	3,116	3,634	4,218	4,944	6,652
Miscellaneous Assets	17,083	24,086	34,891	56,857	55,782
Sub-Total	62,640	71,247	80,621	122,495	167,033
Total Assets	169,370	201,466	242,766	322,271	481,115

LIABILITIES	1970	1971	1972	1973	1974
CREDIT AND BANKING					
Deposits:					
a) From Kun Cooperatives	18,475	19,794	25,639	53,735	85,551
b) From Public	7,402	7,867	9,357	11,605	14,472
Borrowings:					
a) From Bank of Korea:					
i) for agricultural credit	2,673	8,765	8,500	15,770	78,565
ii) for fertilizer business	30,000	32,000	34,000	43,000	20,000
b) From Government of Korea	48,541	50,143	59,717	64,540	70,406
Foreign Loans	8,117	4,957	4,808	4,724	16,818
Agricultural Credit Debentures	83	81	4,043	3,952	3,385
Inter-office Accounts	26,407	36,620	50,455	58,281	71,769
Miscellaneous Liabilities	4,866	15,254	9,057	11,894	19,838
Sub-Total	146,564	175,481	205,576	267,501	380,804
MUTUAL INSURANCE					
Reserves and Other Liabilities	9,409	12,677	16,943	22,750	30,196
BUSINESS					
Accounts Payable and Advance Receipts	6,518	8,501	12,879	15,314	22,862
Other Liabilities	4,199	1,988	4,220	12,769	42,024
Sub-Total	10,717	10,489	17,099	28,083	64,886
CAPITAL AND RESERVES					
Paid-in Capital	492	597	887	1,367	2,371
Reserves (including undistributed profit)	2,125	2,156	2,187	2,235	2,435
Sub-Total	2,617	2,753	3,074	3,602	4,806
Net Profit for the Year	63	66	74	335	423
Total Liabilities	169,370	201,466	242,766	322,271	481,115

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SECOND AGRICULTURAL CREDIT PROJECT

Consolidated Balance Sheet of Kun (County) Cooperatives
(in million won)

Assets	1970	1971	1972	1973	1974
CREDIT AND BANKING					
Cash and Deposit with Banks	30,248	30,428	39,395	74,316	101,418
Loans: a) From Banking Funds	52,928	66,770	80,321	90,727	123,160
b) From Budgetary Funds	11,665	14,732	21,901	21,866	27,856
c) From Temporary Debentures	1,521	1,474	761	720	677
d) From Foreign Funds	153	136	89	770	4,700
e) On behalf of NACF	12,978	9,887	12,244	14,105	16,225
Total Loans	79,245	92,999	115,316	128,188	172,618
Miscellaneous Assets	2,113	3,801	3,855	12,840	28,648
Inter-office Accounts	26,761	37,357	42,902	52,323	80,156
Sub-Total	138,367	164,585	201,468	267,667	382,840
Other Business					
Accounts receivable and Advance Payments	14,524	14,271	15,637	15,346	18,987
Inventory	21,629	21,255	17,308	16,281	36,084
Fixed Assets	7,360	8,697	11,604	12,755	15,444
Other Assets	6,573	6,985	6,879	7,668	10,229
Sub-Total	50,086	51,208	51,428	52,050	80,744
Total Assets	188,453	215,793	252,896	319,717	463,584

Liabilities	1970	1971	1972	1973	1974
CREDIT AND BANKING					
Deposits	88,014	101,058	123,384	157,766	201,380
Borrowings	42,681	59,544	70,869	95,337	148,040
Miscellaneous Liabilities	15,505	12,904	16,543	30,110	51,590
Sub-Total	146,200	173,506	210,796	283,213	401,010
Other Business					
Accounts Payable and Advance Receipts	30,815	29,436	25,481	22,017	42,444
Mutual Insurance	2,029	2,418	3,642	4,412	7,016
Miscellaneous Liabilities	4,235	4,887	6,729	2,236	2,548
Sub-Total	37,079	36,741	85,852	28,665	52,008
Paid-in Capital	1,060	1,331	1,971	3,005	4,802
Reserves Including Undistributed Profit	3,886	4,110	4,142	4,241	4,705
Capital and Reserves	4,946	5,441	6,113	7,246	9,507
Net Profit for the Year	228	105	135	593	1,059
Total Liabilities and Capital	188,453	215,793	252,896	319,717	463,584

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EAP Projects Department
December 15, 1975

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

Income and Expenditure of NACF and Kun Cooperatives
(in million won)

	NACF				Kun Cooperatives			
	1971	1972	1973	1974	1971	1972	1973	1974
Income								
Interest and Commission	13,255	15,160	16,096	29,076	27,004	29,767	31,042	37,657
Income from Business O eration	9,620	10,867	12,976	20,122	43,915	55,350	99,473	161,393
Income from the Mutual Insurance	14,694	18,522	24,192	31,371	6,546	7,108	8,504	10,665
Total	37,569	44,549	53,264	80,569	77,465	92,225	139,019	209,715
Direct Expenditure								
Interest Payment	11,274	13,029	13,066	25,441	20,850	22,780	22,980	27,470
Direct Cost of Business Operation	9,294	10,567	12,726	19,482	41,585	53,279	97,580	158,698
Expenditure on Mutual Insurance	14,367	18,145	23,823	30,979	6,024	6,496	7,985	9,819
Total	34,935	41,741	49,615	75,902	68,459	82,555	128,545	195,987
Gross Profit	2,634	2,808	3,649	4,667	9,006	9,670	10,474	13,728
Less								
Overhead Expenditures								
Wages and Salaries	1,720	1,891	2,380	2,979	5,684	6,327	7,252	9,221
Other Expenditures	891	866	858	1,199	3,108	3,015	2,775	3,863
Total	2,611	2,757	3,238	4,178	8,792	9,342	10,027	13,084
Net Profit from Operations	23	51	411	489	214	328	447	645
Other Income	40	47	40	50	352	333	261	255
Other Expenses	28	60	129	177	487	597	270	235
Net Income from Other Period	31	36	13	61	26	71	155	395
Total Net Profit	66	74	335	423	105	135	593	1,059

EAP Projects Department
December 15, 1975

KOREA
SECOND AGRICULTURAL CREDIT PROJECT
Condensed Balance Sheet of NACF 1/
(in million won)

	1972	1973	1974	1975
Assets				
Cash and Deposits	17,226	29,044	25,062	36,059
Receivables:				
Loans and Overdrafts	117,872	149,814	251,219	333,581
Trade and others	29,300	39,811	53,457	64,912
	147,172	189,625	304,676	398,493
Less allowance for doubtful accounts and loan losses	4,000	6,200	8,115	8,678
	143,172	183,425	296,561	389,815
Inventories	19,436	18,091	37,479	109,334
Due from Government of Korea	40,490	71,731	80,871	189,494
Property and Equipment	3,673	4,092	7,202	9,037
Securities	7,511	9,109	11,100	9,722
Other Assets	2,095	3,455	4,609	7,824
Total Assets	233,603	318,947	462,884	751,285
Liabilities				
Deposits	85,587	131,929	196,577	367,753
Trade payable	14,002	18,437	28,395	42,584
Claims and insurance reserves	12,082	16,788	20,994	27,839
Accrued interest and other liabilities	3,263	10,980	7,282	15,062
Reserve for employees severance	1,402	1,585	1,868	1,898
Borrowings and other debt	112,671	133,499	200,212	285,736
Equity:				
Share capital	887	1,367	2,372	3,725
Capital surplus	400	429	437	417
Reserves	493	511	657	767
Retained earnings	2,816	3,422	4,090	5,504
Sub-Total	4,596	5,729	7,556	10,413
Total Liabilities	233,603	318,947	462,884	751,285

1/ As audited by external independent auditors - Messrs. Arthur Young Co. for 1972 and 1973 - Messrs. San Kyong & Co. for 1974 and 1975.

EAP Projects Department
May 6, 1976

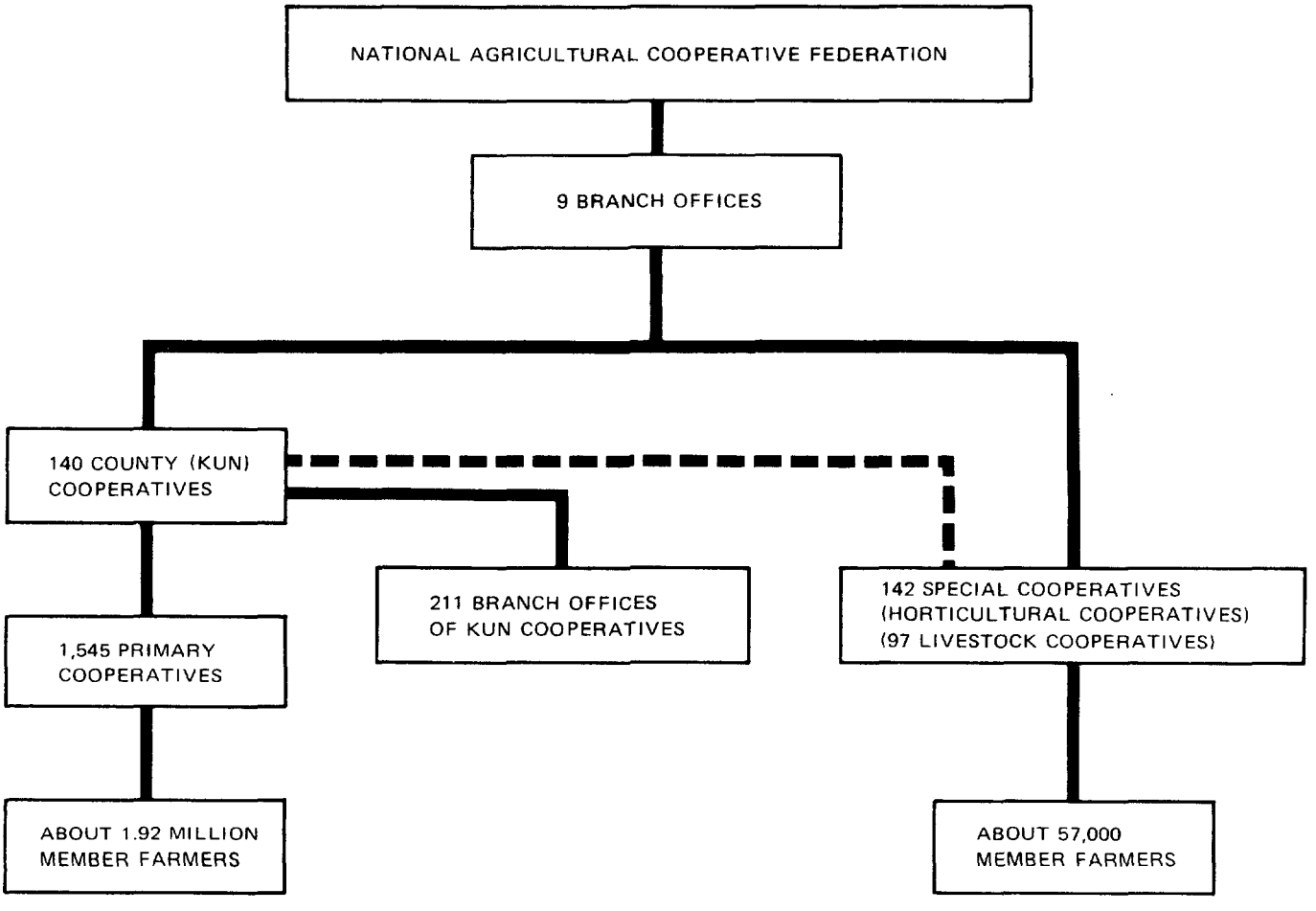
KOREA
SECOND AGRICULTURAL CREDIT PROJECT
Summarized Income Statements of NACF 1/
(in million won)

INCOME	1972	1973	1974	1975
Sales and service fees	48,889	77,802	169,335	235,552
Subsidized fertilizer sales	47,495	59,362	94,920	180,164
Interest income	15,928	18,903	22,391	31,815
Premiums written less unearned premiums	3,591	4,952	6,588	8,327
Commission and other	2,887	3,267	4,863	7,677
Total Income	118,790	164,286	298,097	463,535
EXPENSES				
Cost of sales and service fees	96,120	136,769	261,816	411,286
Interest charges and commissions	12,073	13,051	20,208	30,373
Insurance claims, reserves and dividend to policy holders	4,181	6,795	6,465	9,646
Selling, general and administrative expenses	4,300	5,041	6,832	9,718
Provision for doubtful accounts and loan losses	670	2,200	1,915	563
Total Expenses	117,344	163,856	297,236	461,586
Operating Profit	1,446	430	861	1,949
Other income (net)	518	12	89	- 131
Net income	1,964	442	950	1,818

1/ As audited by external independent auditors - Messrs. Arthur Young Co. for 1972 and 1973 - Messrs. San Kyong & Co. for 1974 and 1975.

EAP Projects Department
May 6, 1976

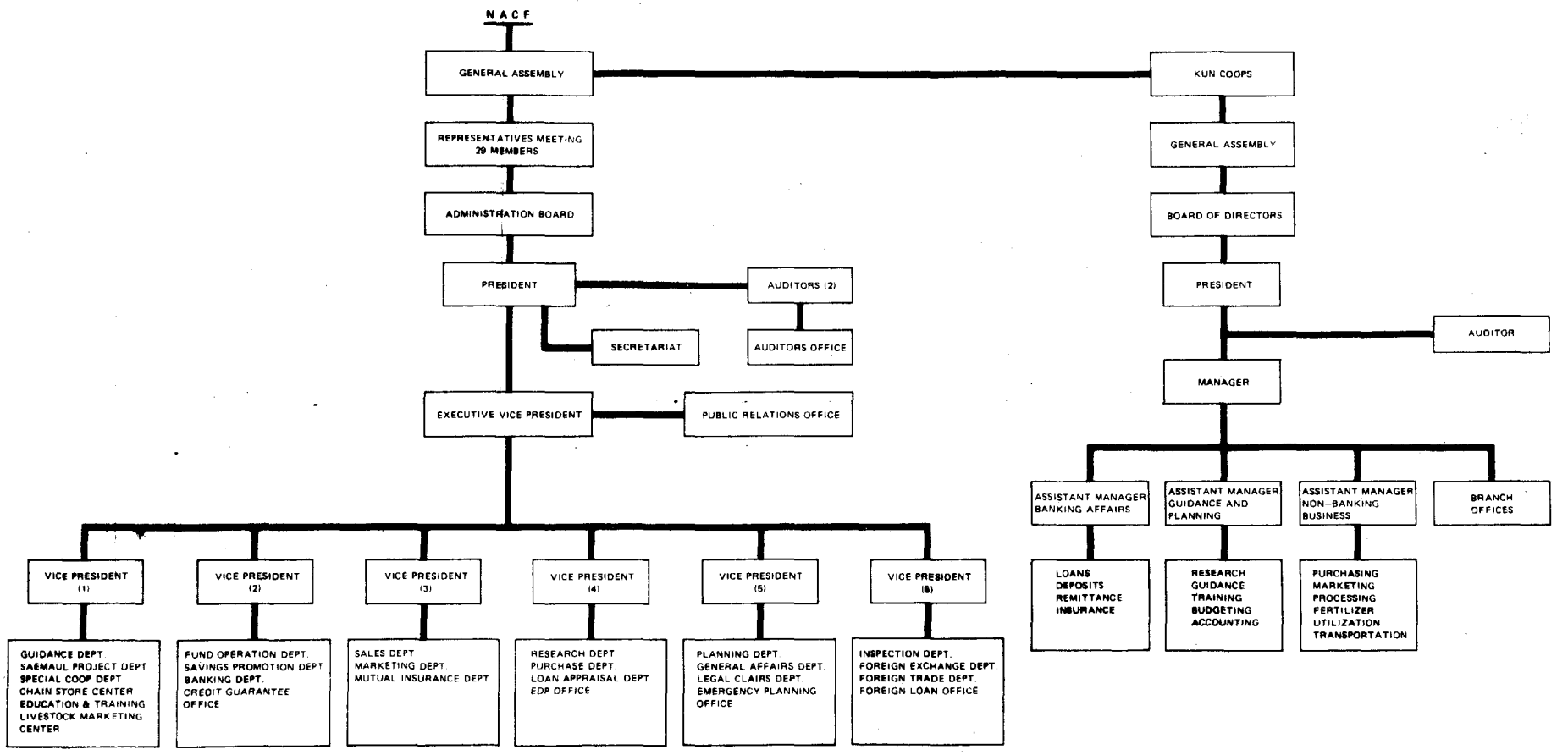
KOREA
SECOND AGRICULTURAL CREDIT PROJECT
ORGANIZATION STRUCTURE OF
THE AGRICULTURAL COOPERATIVES IN KOREA



December 15, 1975

World Bank-15623

KOREA
SECOND AGRICULTURAL CREDIT PROJECT
ORGANIZATION OF NACF AND KUN COOPERATIVES



DECEMBER 15, 1975

World Bank 15622

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

STAFF PROJECT REPORT

D. PROJECT IMPLEMENTATION

1. NACF would administer the Project. Project loans to farmers would be made by the Kun Cooperatives. The Technical Unit (TU) established under the First Agricultural Credit Project would supervise and monitor Project implementation, including evaluation of the actual financial and economic benefits which will result from the Project. It would also advise and train the staff of the Kun Cooperatives in proper appraisal and supervision of Project loans. In view of the larger size of the Project and the introduction of new types of sub-projects, the TU staff would be strengthened. The Project Coordinating Committee to ensure overall coordination between NACF and other agencies involved in the First Project will be maintained in this Project. Details of the responsibilities of these entities in implementing the Project are given in Chapter C.

Procurement

2. Project investment items and operations on individual farms are varied and small, and therefore would not be suitable for international competitive bidding. The scattered location of farms and the fact that Project investments would be spread over several years, are additional factors which would discourage interest by foreign firms.

3. Silkworm rearing houses, on-farm storage, and green houses are simple structures and would be constructed by local artisans and in some cases by the farmers themselves. Adequate sprinkler irrigation and other Project equipment and inputs, including facilities to service them, are available locally. There are numerous suppliers, both private companies and cooperatives including NACF. Prices are competitive. Project procurement would consequently be through normal commercial and cooperative channels by the individual farmer subborrower according to his choice, as in the First Agricultural Credit Project.

Disbursement

4. IBRD disbursements are expected to extend over three years in accordance with the following:

Estimated Schedule of Disbursements

Quarter Ending	Cumulative Disbursements
1977	
September 30, 1977	1.0
December 31, 1977	2.5
1978	
March 31, 1978	4.0
June 30, 1978	5.5
September 30, 1978	7.2
December 31, 1978	8.9
1979	
March 31, 1979	10.6
June 30, 1979	12.4
September 30, 1979	14.5
December 31, 1979	16.6
1980	
March 31, 1980	18.7
June 30, 1980 /1	20.0

/1 Estimated Completion Date.

5. Against appropriate statements, disbursements would be 70% of sub-loans to beneficiaries as disbursed by the Participating Kun Cooperatives. The documentation for the sub-loans for reimbursement certified by the Participating Kun Cooperatives would be retained on file at NACF, and be available for review by IBRD supervision missions.

Lending Terms and Conditions

6. The Government would make available the IBRD Loan and its share of the total Project cost to NACF for on-lending by the Kun Cooperatives to subborrowers. The TU would ensure that the Kun Cooperatives selected to participate in the Project have met the conditions specified in Chapter C para 9. Project investments would be evaluated in terms of their technical feasibility and financial viability based on incremental returns. Subborrowers would pay an annual interest of 12%. This is the maximum rate currently applicable to Government sponsored agricultural credit programs many of which

are charging only 9%. 1/ NACF and the Participating Kun Cooperatives (PKCs) would require minimum interest margins of 1% and 3% respectively to cover administrative costs and provisions for bad debts (Table D-1). The 4% interest margin and the 8.9% interest on the IBRD Loan would consequently require that the cost of the Government funds to NACF would be at 5.7% interest, given the 12% interest charged to subborrowers, and the proposed contributions to total Project cost by the parties concerned (Chapter B para 14) and the repayment of the IBRD Loan and Government funds by NACF to the Government over 17 years, including 3.5 years grace. The Government would bear the foreign exchange risk. Since it is essential to ensure that the incremental working capital necessary to produce the initial output and sales from Project investments be available, such capital should be provided by the Government or NACF if not available from other sources. NACF will establish an account called the Special Fund which would comprise proceeds of the Bank Loan and Government loan (4,300 million Won). The Government will deposit in the Special Fund (a) not later than April 1, 1977 an initial amount of not less than 700 million Won to enable NACF to initiate Project lending, and (b) thereafter at the beginning of each quarter such amounts as shall be required during such quarter by NACF for the purpose of the Project. The total of the Government loan would be made available to NACF not later than January 1, 1980. Agreements acceptable to IBRD, would be entered into between the Government and NACF, and NACF and the PKCs incorporating these terms, and the execution of these agreements would be a condition of Loan effectiveness. The repayment of the IBRD loan by Government would be 17 years including 3.5 years grace.

7. The period of each subloan would be determined by the repayment capacity of the subborrower. Financial models for typical subloans indicate that loan repayment schedules need not exceed the limits shown below:

1/ Interest rates of both the bank and non-bank financial institutions are regulated by the Government and these rates have been adjusted from time to time and generally upwards since the mid 1960s (Chapter A para 8-9). Prevailing rates have been aimed, inter alia, at stimulating overall investments with preferential lending rates for agriculture as part of Government's effort to accelerate investment in that sector in order to help reduce the urban-rural income gap. The Government is currently undertaking various measures, including monetary and fiscal policy measures which emphasize restraint, to reduce significantly the rate of domestic inflation and improve the economy's aggregate savings performance. These measures have already proved effective and the rate of inflation has declined quite markedly. The Government intends to review the interest rate structure and to take the necessary corrective measures in a timely manner if it becomes clear that a positive rate of return on financial savings will not be achieved by the end of 1976.

	Subloan	Grace Period	Period of Repayment	Total Loan Period
		years		
1.	Apple Orchard Development	7	4	11
2.	Silk Worm Rearing Houses	2	7	9
3.	Sprinkler Irrigation	3	5	8
4.	Green Houses	1	5	6
5.	On-farm Storage	2	8	10

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

Project Cash Flow
(in million Won)

	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
I. Cash Inflow																			
IBRD Loan		2,619	3,298	3,783															9,700
Government Loan		1,161	1,462	1,677															4,300
Repayments by sub-borrowers																			
(i) Principal		-	198	627	1,200	1,639	1,793	1,595	1,586	1,551	1,585	1,190	716	320	-	-	-	-	14,000
(ii) Interest		227	728	1,291	1,509	1,339	1,133	930	739	550	362	196	86	19	-	-	-	-	9,109
Income on revolving funds 1/		-	10	51	117	181	249	315	370	423	477	512	503	452	364	260	157	53	4,494
Total Inflow		4,007	5,696	7,429	2,826	3,159	3,175	2,840	2,695	2,524	2,424	1,898	1,305	791	364	260	157	53	41,603
II. Cash Outflow																			
Loans to sub-borrowers		3,780	4,760	5,460															14,000
Interest on IBRD/Government funds 2/		151	493	902	1,099	1,037	954	871	788	706	623	540	457	374	291	208	125	42	9,661
Repayment of IBRD/Government funds		-	-	-	518	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,050	14,000
Project Administrative Expenses 3/																			
(i) Technical Unit		71	79	87	94	104	75	83	90	100	110	121	133	146	35	38	42	47	1,455
(ii) Gun Cooperatives		138	152	167	184	202	111	122	134	148	163	45	39	33	-	-	-	-	1,638
Provision for bad debts 4/		19	61	108	126	112	94	77	62	46	30	16	7	2	-	-	-	-	760
Total Outflow		4,159	5,545	6,724	2,021	2,491	2,270	2,189	2,110	2,036	1,962	1,758	1,672	1,591	1,362	1,282	1,203	1,139	41,514
III. Surplus (Deficit)		(152)	151	705	805	668	905	651	585	488	462	140	(367)	(800)	(998)	(1,022)	(1,046)	(1,086)	89
IV. Cumulative Surplus		(152)	(1)	704	1,509	2,177	3,082	3,733	4,318	4,806	5,268	5,408	5,041	4,241	3,243	2,221	1,175	89	

1/ Placement of revolving funds assumed at 10% per annum.

2/ Average interest rate of 8% per annum (IBRD funds representing 70% of the total bear interest at 8.9% per annum and Government funds representing 30% of the total bear interest at 5.7% per annum).

3/ Includes staff salaries and other administrative expenses.

4/ 1% of outstanding loans to sub-borrowers.

EAP Projects Department
August 23, 1976

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

E. DEMAND AND MARKET ASPECTS

1. The annual incremental output of the Project at full development would be as follows:

	Full Development Year (1)	Annual Incremental Project Output (2)	Annual Domestic Demand at Full Development Year /1 (3)	Domestic Production in 1974 (4)	(2) as % of (3)
		('000 tons)			
Apple Orchard					
Apples	1990	69.2	753	297	9.2
Silk Worm Rearing Houses					
Cocoons	1981	0.81		37.2	
Sprinkler Irrigation					
Apples	1990	9.4	753	297	1.2
Green Houses					
Cucumber, Green Pepper	1980	13.1	150 /2	49 /2	8.7

/1 Based on present trends in population and per capita income growth, and estimated income elasticities of demand.

/2 Main vegetables grown in green houses consisting of cucumber, green pepper, tomato, squash, lettuce, and melon.

2. In newly established apple orchards, it is usual to intercrop with soybeans, peanuts or other vegetables during the first four or five years. The annual output of soybeans as the sole intercrop would be about 1,300 tons. For sprinkler irrigation, the incremental apple production would be smaller than indicated since some of the subloans would be made on pear and orange orchards. This would likewise be true concerning the output of cucumbers

and green peppers from green houses, since other vegetables would also be grown. In the case of the on-farm fruit storage subproject, its annual incremental value in the form of higher prices received from the sale of stored fruit would amount to about W 657 million (US$1.4 million).

3. Incremental output from all the subprojects except sericulture would be primarily for the domestic market. Domestic demand for fruits and vegetables have been increasing significantly as a result of population increases, rapidly rising per capita incomes, and the high income elasticities associated with such foods. Thus, between 1962 and 1974, annual consumption of vegetables and fruits increased by 8% and 12% respectively. In addition, there are also growing opportunities for the export of these products, especially to Japan and the South East Asian countries. For example, exports of horticultural products rose from about US$0.6 million in 1965 to US$9.0 million in 1974, with fresh apple exports increasing from US$0.2 million to US$1.3 million. The Project annual incremental output of apples and vegetables would be easily absorbed by the domestic market since they would account for only minor proportions of the production increases required to meet their projected demand. There would likewise be no difficulty in marketing the Project annual incremental cocoon output since the amount involved is small in relation to total domestic production. Moreover, the decline in Korea's silk exports in 1973/74 which resulted from the recent world-wide economic recession, is expected to be reversed in the near future, as Japan and the other major silk importing countries are already in the process of recovering from the recession. Demand projections cited below were made by NACF based on present trends in population and per capita income growth and estimated income elasticities of demand for the commodities concerned.

Demand

4. Apples. The annual increase in apple production averaged about 9% during 1965-74. Prices increased at a substantially higher rate (Chapter F para 2). Demand for apples is projected to increase from 294,000 tons in 1974 to 753,000 tons in 1990 the year in which full development of the proposed apple subproject is expected. At full development, the annual incremental output of about 69,200 tons from the subproject and 9,400 tons from the sprinkler irrigation subproject, would together account for about 10% of the projected demand. In fact, for sprinkler irrigation, the incremental apple production would be smaller than indicated since some of the subloans would be made on pear and orange orchards.

5. Vegetables. Production of vegetables rose by an annual average of about 10% during 1965-1974 with an increasing proportion, although still a small proportion, grown in green houses. Per capita annual consumption of vegetables almost doubled during 1962-1973, reportedly rising from about 47 kg to 70 kg. The rapid increase in demand for green house grown vegetables is

particularly evident in recent years and is reflected in the substantial increase in prices (Chapter F para 25-26). Demand for green house vegetables has been projected to expand from about 49,000 tons in 1974 to 150,000 tons by 1980 at which time the additional output from the subproject at year of full development would be an estimated 13,100 tons or only about 9% of the projected demand.

6. Sericulture. Subproject incremental annual output of about 810 tons of cocoons at full development (1981) represents only about 2% of the total domestic production in 1974, and should be marketed without difficulty. About 90% of the silk production is currently exported as raw silk and silk fabrics. Exports increased rapidly from 1,129 tons in 1967 to 3,508 tons in 1972. Exports declined to 3,367 tons in 1973 as a result of the world-wide economic recession which commenced during the latter part of that year. With the worsening of the recession, exports declined further to 2,935 tons in 1974. The decline is expected to continue into part of 1975. However, with the economic recovery already underway in the major importing countries, particularly Japan, which is Korea's main export market, the decline in export demand is expected to be reversed soon. Korea's silk exports has been projected to increase by about 7% annually over the next decade. The export projections have been based on a projected Japanese economic growth rate of 5% - 7% annually and on the assumption of a 3% annual growth in world consumption of silk. In response to rapidly rising demand, Korean exports of silk fabrics rose from 170 tons in 1967 to 1,241 tons in 1972, or in terms of its share of total silk exports, from 15% to 37%. The share of raw silk exports declined correspondingly from 85% to 63%. The switch to the production of silk fabrics for export is expected to continue and this in turn would result in greater value added for the domestic sericulture industry.

Marketing

7. Farmers' agricultural products are marketed through private traders and the NACF cooperative network. The cooperatives accounted for about one-fifth of the total farm produce marketed in 1974. The growing importance of the cooperatives as a marketing channel is indicated by the fact that their marketing share has been increasing steadily and is expected by NACF to account for about 30% by 1980.

8. Fruits and Vegetables. Marketing of the Project output of fruits and vegetables would be conducted primarily through the Horticultural and Primary Cooperatives, and private traders. The Cooperatives would market their farmer members' produce on an individual consignment basis through auction sales in urban marketing centres operated by NACF (including some Kun and Primary Cooperatives). Farmers' produce for sale are usually picked up at the farms by the Cooperatives and transported to the marketing centres. The farmer is paid the auction price less commission for marketing services rendered by NACF and the Cooperatives, and transport costs. Fixed by NACF,

the present marketing commission is 6.5% of the auction price - 5% to NACF's marketing centre and 1.5% to the Cooperative concerned. Farmers can expect to receive the net sale proceeds a few days after auction sales.

9. Cocoons. The Sericulture Associations are currently in the process of being organized as special cooperatives under NACF. They will soon become a network for the collection of cocoons from sericulture farmers. Cocoon marketing is regulated by the Government and NACF is the only agency authorized by the Ministry of Agriculture and Fisheries (MAF) to buy cocoons on its behalf. NACF resells the cocoons to licensed silk reeling factories according to regional allocations determined by MAF and the provincial governments. There were 54 reeling factories in 1974 which are privately owned, and together they produced about 4,240 tons of raw silk that year. Selling prices of cocoons to NACF are fixed annually by the Sericulture Promotion Deliberation Committee, composed of several MAF officials, and representatives from producers and reeling factories. NACF and its Kun Cooperatives which are now undertaking the collection of cocoons from farmers, receive a commission of W 20 per kg for the collection services. Farmers are paid cash on delivery, but NACF sells on credit to the reeling factories, which repay with interest (7% per annum) when the reeled raw silk is sold. Cocoon prices paid by the reeling factories are based on export prices for raw silk, processing costs, and a fair profit margin to the factories.

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

F. TECHNOLOGY AND PRODUCTION SPECIFICATIONS

Apple Orchard Development

1. As of the end of 1974, Korea had a total cultivated area of about 2,238,000 ha, of which an estimated 75,100 ha of 3% were under orchards. Of the orchard area, apples accounted for 37%, peaches 16%, oranges 14%, pears 12%, grapes 11%, persimmon 7%, and other fruits 3%.

2. The area under apple orchards increased from about 19,000 ha in 1965 to an estimated 27,500 ha in 1974, or an annual average increase of 5%. Due to improving yields, production increased even faster from 167,000 tons to 297,000 tons, or by an annual average of about 9% during the period concerned. Increasing incomes and demand, as reflected in the steady rise in apple prices, and the Government's efforts in promoting the development of slopeland for orchards have been primarily responsible for the expansion in the apple area. Retail prices for apples reportedly rose nearly three fold from ₩ 54/kg in 1965 to ₩ 160/kg in 1974.

3. Although apples are grown commercially in all the provinces except Jeju, the bulk of the apple area is concentrated in a few provinces with Gyeongsang-Bug accounting for about 57%, Chungcheong-Nam 15%, and Chungcheong-Bug 14% of the total area. Most existing orchards are planted, with standard rootstocks spaced out at about 200 trees per ha. First fruiting usually begins by about the 4th year, and the initial small yields increase gradually reaching economic production levels by the 10th year and full production by the 20th year. Full production yields at about 30 tons/ha can be expected to continue until the 40th year or more and the tree has an economic life of 40-50 years. Varieties grown by most of the orchards, especially the older orchards, are Ralls Janet, Jonathan, Indo, Summer Permain, McIntosh, and Golden Delicious. Ralls Janet and Jonathan account for the bulk of the apples produced. However, new improved varieties and dwarf rootstocks have been introduced in recent years and they are gaining increasing acceptance by growers. The improved varieties which include Fuji, Mutsu, Aori, Starking, Early Blaze, and Star Krimson are of better quality and generally fetch higher prices than the older varieties. The popular dwarf rootstocks are MM-111, and M26.

4. Trees with dwarf rootstocks are smaller and are therefore planted closer at about 800 trees per ha. They would produce heavily after the 5th year, reach full production of about 45 tons/ha by the 10th year, and slowly decline in production after the 15th year. Their economic life is about 25 years. Thus, compared with standard rootstocks, dwarf rootstocks have significantly higher output in the early years, which in turn means quicker financial returns. However, they cost more to establish and have a much

shorter economic life, including a faster decline in yields, than standard rootstock trees. Moreover, dwarf rootstocks are relatively new to Korea and Korean farmers are not as experienced with them as they have with the old established standard rootstocks.

5. In view of the above considerations, it is proposed that subproject apple orchards would have about one half the area grown with standard rootstocks and the other half with dwarf rootstocks. The subproject would finance the development of 2,100 ha of apple orchards over a three-year period. Based on available land and lending for similar purpose under the on-going Agricultural Credit Project, the majority of sub-loan demand would be for the development of orchards ranging between one to two ha, and the potential loan demand areas would be in seven out of the nine provinces with Gyeongsang-Bug, Jeonla-Bug, Gyeonggi, and Chungcheong-Bug expected to account for the bulk of the sub-loans. About 1,400 sub-borrowers would be involved.

6. The development cost for a 1.5 ha orchard is used for illustrative purposes. Major investment items are land preparation, saplings, fertilizers/manure, pesticides, power sprayer, small hand tools, and labor. Details of the investment and operating costs are given in Chapter G. Land preparation would include terracing and construction of drainage ditches where necessary. 600 dwarf and 150 standard root saplings would be planted in holes of about 1.0m x 1.0m x 0.9m. 20-25 kg of manure would be incorporated in the soil around each sapling at time of planting. 10 trees can be planted per man day. Fertilizers, viz. nitrogen phosphate and potash, would be applied at about 150-200 kg/ha during the first year, with the rates increasing annually to about 500 kg/ha of N,P,K for mature trees. Increasing rates of manure would also be applied up to 12-15 tons/ha annually for trees in full development production. Application of lime would be 2 tons/ha at planting time and 1 ton/ha annually thereafter. About 20 kg/ha borax would be applied annually. Pesticide sprays would be applied 16-18 times a year. The spraying facility would include a mixing tank, 8 horse power sprayer with about 50m of spray hose. Small hand tools would be hauling carts, ladders, pruning and thinning shears, spade, etc. The subproject would finance the development costs up to first fruiting, that is over 3 years.

7. In newly established orchards, the usual practice is to intercrop with soybeans, peanuts, or other vegetables for several years until the shade from the fruit trees makes this practice no longer possible. Since intercropping, which reduces the financial burden of the grower and makes more productive use of his land and labor, should be encouraged, the subproject costs would include the inputs necessary to produce the initial crop.

8. Good quality saplings required by the subproject can easily be supplied by the 43 registered private nurseries accredited by the Ministry of Agriculture and Fisheries (MAF). Provincial Government officers inspect all saplings to ensure they are disease free before delivery to farmers. The nurseries, as part of their sales service, provide technical advice on proper cultural practices to their buyers. Extension officers of the Office of Rural Development, MAF and horticultural cooperatives, to which many orchard growers belong, also provide such advice.

9. As part of its efforts to expand and diversify agricultural production, the Government has in recent years begun to actively promote the development of uncultivated slopeland and reclaimed riverbed land for agricultural purposes. Under the Government's Farmland Extension Promotion Law of April 1975, an estimated 350,000 ha of such land would be available, of which approximately 124,000 ha of slopeland (15^{o}-20^{o} slope) and some 30,000 ha of riverbed land would best be planted with fruit trees. Since most of this land is suitable for apple production, ample land therefore exists for the 2,100 ha of apple orchards to be developed under the subproject. Moreover, most of the land belongs to farmers. Some areas have soils that are unsuitable, being too sandy, shallow, poorly drained, subject to a high water table, or with insufficient moisture. To avoid planting apples on such soils, NACF's Technical Unit should in consultation with the Institute of Agricultural Sciences at Suweon, first determine that a subborrower's land would be suitable for apple development before he can be granted a loan for this purpose. Alternatively, Loan Appraisal Officers of the participating Kun cooperatives should be trained at the Institute to do this job.

On-Farm Storage

10. Most Koreans prefer to consume their fruit in fresh rather than processed forms. Given this preference and the rising trend in production, seasonal fluctuations in prices would become more pronounced unless part of the output at harvest is stored for sale over an extended marketing period. Farmers with on-farm storage not only receive higher prices for the stored fruit sold during the offseason, but also help to maintain farmgate prices at harvest by removing excess fruit from the market. Consumers will also benefit by a spreading out of available supplies over an extended period, which in turn would reduce seasonal price fluctuations and lower prices during the offseason.

11. As their output increased, growers began storing storable fruits, essentially apples, pears, and oranges, in cellars and semi-cellars on their farms. Not all varieties are storable. These storage facilities are inefficient and poorly ventilated so that the stored fruit is subject to excessive spoilage.

12. In recent years, improved storage facilities have been introduced. These are concrete buildings with insulated walls and ceilings and more effective ventilation which resulted in better quality stored fruits, less spoilage, and a longer storage period. Storage usually begins in November for apples and pears and early December for oranges. Maximum storage periods are 6-7 months. The harvested fruit is laid under the trees and allowed to cool for about 24 hours before being sorted and packed into wooden boxes for storage. Each wooden box holds 18-19 kg of apples/pears or about 15 kg of oranges. The boxes are then placed in storage stacked 9 high for apples and pears, and 7 high for oranges. The lower stack for oranges is due to their greater need for good ventilation. The storage capacity is about 1-1/2 ton apple/pear or one ton orange per pyong (3.3 m^2) of storage space.

13. Based on current practices and experiences of farmers with storage, some 70-75% of the output at harvest is stored. For apples, about 30% of the stored fruits would be sold at 2-3 months after storage with no damaged or spoiled fruit, another 25% by the 4th month with 5% (1.25% of crop) damaged fruit and 1% (0.25% of crop) spoiled fruit, and the remaining 20% by the 6th month with 5% damaged fruit and 5% spoiled fruit. For pear, 20% would be marketed within three months with no damaged or spoiled fruit, another 30% by the 4th month with 5% damaged fruit, and the remaining 25% by the 6th month with 5% damaged and 5% spoiled fruit. For oranges which are more difficult to store, 55-60% would be marketed by the 2nd month with no spoiled fruit, and the remaining 40-45% by the 4th month with 20% spoiled fruit. Damaged fruit would be sold at much lower prices and spoiled fruit are discarded. Although seasonal increases in prices have ranged up to 150% of harvest prices, the percentage increases in recent years for the different storage periods have averaged as follows:

Storage Period	% Increase Over Price at Harvest Time
Apples	
2 months	20
4 months	30
6 months	40
Pears	
3 months	15
4 months	25
6 months	30
Oranges	
2 months	25
4 months	40

14. The extent of the present and anticipated storage shortage is indicated in NACF's projections (up to 1980) of storage needs for apples, pears, and oranges as shown below:

	Storable Production ('000 tons)	Quantity to be Stored ('000 tons)	Required Storage Floor Space ('000 pyong)	Existing Storage Floor Space ('000 pyong)	Increase Storage Needed Each Year ('000 pyong)
1975	375.4	292.3	205.1	145.0	60.1
1976	412.0	329.6	236.5		31.4
1977	463.7	370.9	270.7		34.2
1978	518.2	414.5	306.8		36.0
1979	574.3	459.5	343.3		36.6
1980	632.5	505.1	381.1		37.9

The projections take into account the age of trees, composition of storable varieties and increase in yields. Basic data were derived from a survey made by MAF in 1970. Assumptions used are:

(a) About 80% of storable production would be stored.

(b) Storing capacities per pyong are about 1.5 tons for apples/pears and 1 ton for oranges.

(c) Existing storage calculated from survey made by MAF in 1970 plus storage constructed since that year including those financed under Government programs and on-going Agricultural Credit Project.

15. Under the subproject, financing will be provided to fruit farmers to construct improved on-farm storage of about 20,000 pyong over a 3-year period for storing mainly apples, pears and oranges. The storage space proposed would account for only a small proportion of the anticipated storage needed during the remainder of the decade. Although the actual size of storage to be built would vary according to farmers' present and anticipated needs, a 20 pyong storage for apples/pears has been selected for illustration purposes since this is the common size currently being built by farmers. The maximum storage capacity would be about 30 tons of apples/pears or 20 tons of oranges. This capacity would provide sufficient storage for the majority of apple and pear growers with 1-2 ha and orange growers with 0.5-1.0 ha.

16. The investment items would comprise a storage building and wooden boxes for packing the fruits for storage. The building would have concrete block walls, about 10 cm thick for the inside wall, 15 cm for the outside wall and with 10 cm of sawdust or styrofoam in between as insulation. The inside ceiling would consist of 2.5 cm styrofoam mounted on 0.5 cm plywood sheeting. In the case of orange storage, the building would be divided into 2 rooms, each with an exhaust fan (45 watt 50 cm diameter). The low volume fans would provide better ventilation required by this fruit. A 20 pyong building would be about 6.6 meters wide, 10 meters long and 3.6 meters high. A break-down of the investment cost for this size storage is given in Chapter G.

17. The major areas of subproject financing would be in the provinces of Gyeongsang-Bug, Chungcheong-Nam, Gyeonggi, and Chungcheong-Bug for apples and pears; and Jeju for oranges. About 1,000 subborrowers are envisioned.

Sprinkler Irrigation for Orchards

18. Approximately two-thirds of the annual rainfall in Korea, which has averaged about 1,200 mm, occurs during the summer. Because of this concentration, seasonal shortages of rainfall in relation to optimum water requirements for agricutural production occur quite regularly, which in the absence of irrigation had resulted in lower crop production and yields. Data collected for 1970-72 indicate that in the main orchard areas prolonged periods of insufficient or no rainfall frequently occur from March to October. The result is slower tree growth and production of smaller and lower quality crops. Thus, affected apple orchards generally produce smaller fruit with a high incidence of skin cracks and poorer coloring. The effects tend to be more pronounced on orchards with sandy soils and volcanic ash soils because of their low water retention capacities, and there are many such orchards. For example, the majority of the orchards in the main apple producing province of Gyeongsang-Buk are on riverbed soils which are rather sandy, and many of the orange groves in Jeju are on volcanic ash soils and this province accounts for over 90% of the total orange output. Many orchards are also grown on heavier soils, viz. loams, sandy loams and clay loams.

19. Most of the orchards are not irrigated. Although those that are irrigated commonly use surface irrigations, some have installed sprinkler irrigation in recent years. The fact that the irrigated apple orchards are located essentially in Gyeongsang-Buk province may explain why it has the highest yields, about one-third higher than the average yield for all producing areas.

20. Surface irrigation would not be suitable on light soils because they are very permeable. Soil near the point where the irrigation water is released would be overwet while soil a short distance away would be wet insufficiently. Overwetting soils also causes leaching of fertilizers and may result in soil erosion and drainage problems. Proper and efficient irrigation of such soils would require use of sprinklers. Other main advantages of sprinkler irrigation are:

(a) Rough land can be irrigated with a minimum of levelling and disturbance of the top soil.

(b) Light and even applications of water can be made on sandy soils, thereby allowing efficient distribution of the right amount of water.

(c) Eliminates surface run-off.

(d) Use can be made of small supplies of water too small for surface irrigation.

(e) Affords frost protection in the winter and enables liquid fertilizer application.

21. Yield increases with sprinkler irrigation have been estimated at about 20-25% for apples, pears, and oranges. In addition to yield increases, improved fruit quality, in the form of larger fruit, better coloring and virtual absence of skin cracks (apples), would also be obtained. Better quality fruits generally fetch 10-20% higher prices.

22. The installation costs for a sprinkler system for a 2 ha orchard is used for illustrative purposes. Major investment items would include a concrete well, pumping station, sprinkler system and installation costs. The well would be about 6m deep and 2m wide. The pumping station would comprise a diesel engine of about 10 hp and centrifugal pump (2-1/2 inches in diameter with 4 impellers), pump base, pipes, pipe fittings and sluice valves. The sprinkler system would include about 1,500m of PVC pipes for the main and lateral lines, steel riser pipes, pipe fittings, and sprinkler heads. The PVC pipes to be laid underground would provide for some 104 sprinkler outlets distributed through the 2 ha orchard. The outlets would protrude about 30 cm above the ground and be equipped with a coupling device to which steel riser pipes 20 mm in diameter and 3 m long can be attached. Sprinkler heads will be threaded to the tops of the riser pipes. Two sets of 16 riser pipes plus sprinkler heads will be provided. While one set is operating, the other would be moved to the next location. Sprinklers will operate for about 3 hours at each location and will apply about 20 mm of water. A total of 24 hours or 2 man days will be required to irrigate 2 ha. About 16 irrigations would be required annually. Detailed investment and operating costs are given in Chapter G.

23. There are several domestic private companies which design, supply and install sprinkler irrigation systems. These companies have qualified personnel who in addition to designing and installing sprinkler systems, also provide technical assistance to their clients. All the sprinkler component parts are manufactured locally and of good quality. Sprinkler systems required by the subproject can easily be met by the existing suppliers.

24. Under the subproject, 800 farmers, each owning about 2 ha or more of producing orchards, would be given loans to install sprinkler irrigation. To avoid premature installation, orchards should already be producing fairly heavy crops as from 10-15 year old trees. Orchards significantly less than 2 ha would normally be unable to justify the use of sprinkler irrigation, and would therefore not qualify for participation. Eligible orchards would in addition be those with light soils where use of surface irrigation would not be suitable or efficient. Most of such orchards would be on volcanic ash soils or on riverbed soils where an adequate supply of water is available within a few meters of the soil surface. Some orchards on slopeland which could profit from sprinkler irrigation would also qualify, provided an adequate supply of water for irrigation is available. Although some of the sub-loans would be made on pear and orange orchards, the majority are expected to be on apple orchards.

Green Houses for Vegetable Production

25. Korea's significant increases in per capita incomes and population growth, including its urbanization, since the mid 1960s have led to a rapidly growing domestic demand for higher quality food, viz. vegetables, fruit and livestock products. Thus, vegetable production rose from an estimated 1,576,000 tons in 1965 to 2,975,000 tons in 1974, an increase of about 90% or by an annual average of 8%. Prior to the early 1960s, virtually all the vegetables were grown as field crops from late spring to early autumn when prevailing temperatures were sufficiently warm to permit growth. Since then, an increasing proportion of the vegetables have been grown in vinyl covered green houses.

26. Vinyl covered green houses were first introduced around the mid 1960s. Located near urban centres and in the southern parts of the country where more moderate temperatures prevail, the area under such houses increased from about 530 ha in 1965 to 3,500 ha in 1974. Although small in relation to the total vegetable area (274,000 ha), the real significance of green houses is their ability to produce vegetables during the cold months when field production would not be possible. The availability of vinyl and PVC at low prices, and the increasing demand and consequent high prices for vegetables particularly during the cold months had made green house production a practical and profitable undertaking. Increasing prices and sharp seasonal price differences for green peppers and cucumbers are shown below:

Wholesale Prices for Green Peppers and Cucumbers
(₩/kg)

	1969	1972	1974
		Green Peppers (Grade A)	
Green House Production (Dec. - June) Average Monthly Price	242	290	594
Field Production (July - Nov.) Average Monthly Price	51	77	78
Average Monthly Price for the year	115	168	379
		Cucumbers (Grade A)	
Green House Production (Oct. - May) Average Monthly Price	98	152	234
Field Production (June - September) Average Monthly Price	28	48	57
Average Monthly Price for the year	67	118	175

The Government had also encouraged investments in green houses by providing loans for such purposes.

27. Of the existing vinyl green houses, most of them use bamboo and wood for the house frames and other supporting structures. They generally do not have adequate irrigation, heating, and ventilation facilities which are essential for timely and high yield production of good quality vegetables. However, improved green houses using PVC or metal pipes for the frames and supporting structures and with more effective heating, ventilation and irrigation facilities have been constructed in recent years. Although the investment costs are higher, they are more productive and profitable than the older green houses, which in addition would have the following disadvantages:

(a) Generally susceptible to damage from heavy snowfall and strong winds.

(b) Require excessive internal supporting structures which in turn would reduce the space available for plants and lowers labor productivity.

(c) Have a much shorter life.

Yields from the older green houses are consequently low at 23-25 tons/ha for fruit type vegetables. Substantially higher yields have been obtained from improved green houses, e.g. about 50 tons/ha for green peppers and 55-60 tons/ha for cucumbers.

28. Under the subproject, financing will be provided to farmers for the construction and equipping of improved green houses covering 120 ha. Major investment categories are metal (iron/steel) green house frames, vinyl/polyethylene and straw thatch to cover the frames, irrigation facility, oil stoves for heating, electric fans for ventilation, pesticide sprayers, small hand tools, and incremental working capital required to produce the initial crop of vegetables. The irrigation facility would consist of a small, e.g. 0.5 hp electric water pump, and plastic tubes that rest on the soil surface along each row of plants. Small water emitters on the tubes would release water near each plant (trickle irrigation). Incremental working capital would include costs for seed, seedling pots, seed bed soil, fertilizers/pesticides, supports for the plants, fuel, and labor. Detailed costs are given in Chapter G.

29. The development cost for an improved green house covering 0.1 ha is used for illustrative purposes. The green house would preferably comprise three separate units so that production can be staggered for more effective use of labor and equipment, and to enable crop marketings to be spread out. About 1,200 sub-loans would be made to farmers who are experienced in green house production, and are located near important urban consuming centers, or in areas which have easy access to transport facilities connected to the urban centers.

30. Vegetable research is conducted at the Horticultural Experiment Stations at Suweon and Gimhae. The latter specializes in green house production. Research results in cultural improvements, including optimum cropping patterns, are relayed to farmers in the form of extension bulletins and through the horticultural extension officers of the Ministry of Agriculture. Horticultural Cooperatives to which most vegetable farmers belong also provide advice on cultural practices.

Silkworm Rearing Houses

31. On-farm sericulture activities comprise two types of operations, mulberry tree cultivation and the rearing of silk worms. Both are labor intensive. In 1974, there were some 88,000 ha of mulberry trees, and production of cocoons amounted to 37,000 tons valued at about W 54 billion. 476,000 farm households are engaged in this activity. Sericulture production is scattered throughout the nine provinces, but the main producing areas are Gyeongsan-Buk with 32%, Jeonla-Bug 15%, and Chungcheong-Bug 12% of the cocoon production. The subproject would involve the improvement of less than 2% of the total area under mulberry production.

32. Mulberry seedlings are produced by about 500 accredited private nurseries. One year old seedlings are used to plant fields from which leaves are harvested to feed the silk worms. Planting densities range from 9,000 to 9,500 seedlings per ha. Mulberry trees have an economic life of 20 years. Production starts in the third year, and full production is reached by the fifth year, and would continue to the fifteenth year. National yields of mulberry leaves average 11.4 tons/ha on upland and 7.2 tons/ha on slopeland. With adequate fertilizers (per ha annual application of 15 tons manure, 1.5 tons 24-11-15 fertilizers and 1 ton lime), and good cultivation practices, yields of about 19 tons have been obtained.

33. Silk worms are raised in rearing houses from silk worm eggs purchased by farmers from 54 private companies regulated by the Government. Traditional rearing houses are poorly constructed with insufficient space and without proper ventilation and temperature control. Some are lean-to sheds without walls. Cocoon production under such conditions is generally low and of poor quality. Improved concrete rearing houses which allow proper temperature and humidity control and adequate ventilation, are essential for production of higher yield and good quality cocoons.

34. Silk worms are usually raised and their cocoons harvested during spring and autumn, or twice a year. These two crops are generally timed to avoid competition with peak labor requirements for food grain production. There are two methods of feeding silkworms. The traditional and most commonly used method involves the picking of mulberry leaves to feed the silk worms. The other is the branch-feeding method whereby instead of picking leaves, branches are cut from the mulberry trees and the silk worms are allowed to feed on the leaves of the branches. This method which was introduced in recent years, would reduce labor use to about one-half of that required under the traditional method. Branch-feeding which requires more

space is used essentially by farmers with improved rearing houses. The optimum space requirement for such houses using branch-feeding is about 4.5 pyongs per case of silk worms. Improved rearing houses with branch-feeding and use of improved rearing tools have been able to raise a substantially larger number of silk worms and obtain significant improvements in cocoon production in terms of yield and quality than under traditional facilities and practices (para 36). In view of its greater productivity and profitability, the Government has begun to encourage farmers to invest in improved rearing houses and to adopt the branch-feeding method of raising silk worms.

35. The subproject would finance improved rearing houses and equipment to enable sericulture farmers to expand production of cocoons. It would also finance the first year's cost of improved inputs to existing plantings in order to raise the yields of mulberry leaves to provide sufficient feed for the expansion in silk worm rearing. Accordingly, the main purpose of the subproject is to increase the productivity of sericulture production without the need to expand the existing mulberry acreage.

36. Sub-loans would be made to about 3,500 sericulture farmers owning 0.35 ha or more of mulberry plantings in production. The typical sub-loan would finance an improved rearing house of 20-25 pyongs floor space, and rearing equipment, the major items of which are pivot cocoon beds, wooden racks and trays for branch-feeding of the silk worms, litter cleaning nets, a two-wheel cart, and small hand tools. The rearing capacity would be five cases of silk worms a crop, or 10 cases for the two-crop year and cocoon yields are expected to be at least 35 kg per case of silk worms with quality improvements amounting to about a 15% higher price than that for the average grade cocoon. (Farmers with 0.35 ha of producing mulberry with traditional facilities and practices are generally rearing about 4 cases of silk worms a year and getting an average of 30 kg of cocoons per case of worms.) Inputs to improve the mulberry plantings would mainly be for fertilizers/manure, pesticides, hired bullock power and manual labor. Leaves from the 0.35 ha of improved mulberry would be sufficient to feed the quantity of silk worms envisaged. Detail investment costs are given in Chapter G.

37. Research is carried out at the Office of Rural Development Sericulture Experiment Station at Suweon to (a) improve mulberry varieties and cultural practices, (b) breed improved silk worm strains which are also disease resistant, and (c) improve rearing and silk reeling techniques. Extension services to farmers are provided by the field extension officers of the local governments and leading farmers who have undertaken intensive training courses at the Sericulture Training Centre. Sericulture Associations also provide technical advice and other extension services, in addition to farm inputs.

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

G. FINANCIAL ANALYSIS

1. Current prices have been used in estimating Project returns. These prices and details of the financial benefits and cash flow projections, derived from typical investment models, are presented in Tables G-1 to G-10. As indicated in the models, the incremental incomes and financial returns would be sufficiently high to make the proposed investments attractive. Incremental incomes would be higher to the extent that the labor requirements would be accounted for by family labor. The financial rates of return for the subprojects would range from 27% to 35% as shown below:

	Financial Rate of Return (%)
Apple Orchard	33
Silk Worm Rearing Houses	30
Sprinkler Irrigation	35
Green Houses	32
On-farm Storage	27

In calculating these returns, current prices for both inputs and outputs were assumed to continue at their present levels.

2. Since it is a relatively new technology in Korea, the use of sprinkler irrigation would entail some risks which, however, would be minimized through careful selection of subborrowers and close supervision of such investments by NACF's Technical Unit. The financial rate of return at 31% would still be satisfactory even if yield improvements are up to 20% lower than expected.

3. The value of total incremental production would be about US$32 million per annum at full development. The level of investments and expansion in output can be expected to generate substantial increases in employment, both family and paid labor (Chapter H para 2).

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

Farm Model

Apple and Pear Storage

	1	2	3	4	5	6	7	8	9-23	24-25
Typical Yields Mt/Ha										
Apples	24.0	26.0	28.0	29.0	30.0	30.0	30.0	30.0	30.0	30.0
Pears	11.3	12.5	15.0	16.5	18.0	19.5	21.0	22.0	23.0	23.0
Production Mt 1/										
Apples	30.0	32.5	35.0	36.3	37.5	37.5	37.5	37.5	37.5	37.5
Storable 75% of production	22.5	24.4	26.3	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Marketed at harvest under Project	7.5	8.1	8.7	9.3	10.5	10.5	10.5	10.5	10.5	10.5
Pears	2.8	3.1	3.8	4.1	4.5	4.9	5.3	5.5	5.8	5.8
Storable 75% of production	2.1	2.3	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Marketed at harvest under Project	0.7	0.8	1.0	1.1	1.5	1.9	2.3	2.5	2.8	2.8
Sales	(won '000)									
A. Without Project										
Apples @ W 97/kg	2,910.0	3,152.5	3,395.0	3,521.1	3,637.5	3,637.5	3,637.5	3,637.5	3,637.5	3,637.5
Pears @ W 88/kg	246.4	272.8	334.4	360.8	396.0	431.2	466.4	484.0	510.4	510.4
Total	3,156.4	3,425.3	3,729.4	3,881.9	4,033.5	4,068.7	4,103.9	4,121.5	4,147.9	4,147.9
B. With the Project 2/										
Apples sold at harvest @ W 97/kg	727.5	785.7	843.9	902.1	1,018.5	1,018.5	1,018.5	1,018.5	1,018.5	1,018.5
Apples sold after 2-3 mo.storage @ W 116/kg	1,044.0	1,131.0	1,218.0	1,252.8	1,252.8	1,252.8	1,252.8	1,252.8	1,252.8	1,252.8
Apples sold after 4 mo.storage @ W 126/kg	888.3	962.6	1,037.0	1,066.0	1,066.0	1,066.0	1,066.0	1,066.0	1,066.0	1,066.0
Damaged fruit @ W 38/kg	14.4	15.6	16.7	17.1	17.1	17.1	17.1	17.1	17.1	17.1
Apples sold after 6 mo. storage @ W 135/kg	729.0	789.8	850.5	874.8	874.8	874.8	874.8	874.8	874.8	874.8
Damaged Fruit @ W 41/kg	12.3	13.9	15.2	14.8	14.8	14.8	14.8	14.8	14.8	14.8
Sub-total	3,415.5	3,698.6	3,981.3	4,127.6	4,244.0	4,244.0	4,244.0	4,244.0	4,244.0	4,244.0
Pears sold at harvest @ W 88/kg	61.6	68.2	83.6	96.8	132.0	167.2	202.4	220.0	246.4	246.4
Pears sold after 3 mo. storage @ W 102/kg	57.1	63.2	77.5	81.6	81.6	81.6	81.6	81.6	81.6	81.6
Pears sold after 4 mo. storage @ W 110/kg	88.0	97.2	119.1	125.4	125.4	125.4	125.4	125.4	125.4	125.4
Damaged fruit @ W 31/kg	1.2	1.5	1.8	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Pears sold after 6 mo. storage @ W 115/kg	72.5	80.3	98.3	103.5	103.5	103.5	103.5	103.5	103.5	103.5
Damaged fruit @ W 35/kg	1.4	1.4	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Sub-total	281.8	311.8	382.0	411.0	446.2	481.4	516.6	534.2	560.6	560.6
Total	3,697.3	4,010.4	4,363.3	4,538.6	4,690.2	4,725.4	4,760.6	4,778.2	4,804.6	4,804.6
Incremental Income From Project	540.9	585.1	633.9	656.7	656.7	656.7	656.7	656.7	656.7	656.7
Investment										
Storage Building 20 pyong 3/	1,646.0									
Storage Boxes 1600 @ W350/box	560.0			56.0	56.0	56.0	56.0	56.0	56.0	
Sub-total	2,206.0			56.0	56.0	56.0	56.0	56.0	56.0	
Operating Costs										
Storage, handling & re-packing	60.4	65.5	71.4	73.6	73.6	73.6	73.6	73.6	73.6	73.6
Repair & Maintenance Boxes	23.0	24.9	27.2	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Repair & Maintenance Building	-	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9	32.9
Sub-total	83.4	123.3	131.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5
Total Cost	2289.4	123.3	131.5	190.5	190.5	190.5	190.5	190.5	190.5	134.5
Net Incremental	(1748.5)	461.8	502.4	466.2	466.2	466.2	466.2	466.2	466.2	522.4

Financial Rate of Return - 27%

1/ Production based on 1.25 ha of typical 15-18 year old apple orchards and on 0.25 ha of typical 10-12 year old pear orchards in Korea.

2/ Apple crop sold as follows: 25% at harvest, 30% after 2-3 months storage, 25% during the 4th month of which 5% (1.25% of crop) is considered damaged and 1% lost (.25% of crop) and the remaining 20% market by the end of the 6th month of which 5% (1% of crop) is considered damaged and 5% (1% of the crop) is lost.
Pear crop sold as follows: 25% at harvest, 20% after 3 months of storage, 30% after 4 months of which 5% (1.5% of crop) is considered as damaged and the remaining 25% marketed after 6 months of storage with 5% (1.25% of the crop) considered damaged and 5% (1.25% of crop) is lost.

3/ The storage building of 20 pyeong (66 sq.meters) has a capacity of 30 mt of apples or pears. 1st year storage is considered 80% full reaching full capacity in the 4th year onward.

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

Apple and Pear Storage

Farmer's Loan Cash Flow
(in W '000)

Year	1	2	3	4	5	6	7	8	9	10	11-23	24-25
Inflow												
Loan	1,544.2											
Incremental Sales	540.9	585.1	633.9	656.7	656.7	656.7	656.7	656.7	656.7	656.7	656.7	656.7
Total	2,085.1	585.1	633.9	656.7	656.7	656.7	656.7	656.7	656.7	656.7	656.7	656.7
Outflow												
Investment and Replacement	2,206.0			56.0	56.0	56.0	56.0	56.0	56.0	56.0	56.0	-
Operating Costs-Storage	83.4	123.3	131.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5	134.5
Debt Service (Interest and Principal	185.3	185.3	378.3	355.1	332.0	308.8	285.7	262.5	239.3	216.4	-	-
Total	2,474.7	308.6	509.8	545.6	522.5	499.3	476.2	453.0	429.8	406.9	190.5	134.5
Surplus or (Deficit)	(389.6)	276.5	124.1	111.1	134.2	157.4	180.5	203.7	226.9	249.8	466.2	522.2
Cumulative	(389.6)	(113.1)	11.0	122.1	256.3	413.7	594.2	797.9	1,024.8	1,274.6	7,335.2	8,379.6

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SECOND AGRICULTURAL CREDIT PROJECT

0.1 Ha Green House (Cucumber and Green Peppers)

(W 000's)

Year	1	2 - 5	6	7 - 10	11	12 - 15
I. Sales						
Cucumber 1/	807	965	965	965	965	965
Green Pepper 2/	1,628	1,937	1,937	1,937	1,937	1,937
Sub-total	2,435	2,902	2,902	2,902	2,902	2,902
II. Investment and Replacement Costs						
Metal Frame	1,205					
Irrigation Facility 3/	212		94		212	
Electric Fans	180		180		180	
Heating Facility						
Oil Stoves	260		260		260	
Thatch, Polyethylene film/band	307					
Sprayers	77					
Small tools/implements	32					
Incremental Working Capital 4/						
Seed/seed pots	10					
Seed bed soil/heating material	174					
Supports	59					
Fertilizer/pesticide	34					
Fuel/electricity	228					
Labor	315					
Sub-total	3,093		534		652	
III. Operating Costs 5/						
Seed/seed pots	13	22	22	22	22	22
Seed bed soil/heating material	43	216	216	216	216	216
Supports	40	40	40	40	40	40
Fertilizer/Pesticide	37	70	70	70	70	70
Fuel/electricity	516	744	744	744	744	744
Thatch, Polyethylene film/band	165	165	165	165	165	165
Labor	452	767	767	767	767	767
Miscellaneous (repairs/maintenance)	106	106	106	106	106	106
	1,372	2,130	2,130	2,130	2,130	2,130
IV. Benefit (I - II - III)	(2,030)	772	229	772	120	772
V. Opportunity Cost of Land 6/	44	44	44	44	44	44
VI. Net Benefit (IV - V)	(2,074)	728	194	728	76	728

FINANCIAL RATE OF RETURN: 32%

1/ 5,380 Kg x W 150 in 1st year; 5,850 Kg x W 165 in subsequent years.

2/ 4,650 Kg x W 350 in 1st year; 5,030 Kg x W 385 in subsequent years.

3/ Includes pump, plastic pipeline, and installation cost. Pipeline replaced year 6, whole facility year 11.

4/ For production of initial crop of cucumbers.

5/ For initial crop of green peppers in year 1, and both crops (cucumber and green peppers) in subsequent years.

6/ Net production value from 0.1 ha taken from rice production.

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

0.1 Ha Green House: Farmer's Cash Flow [1/]

(W 000's)

	1	2	3	4	5	6	7 - 10	11	12 - 15
I. Inflow									
Loan	2,165								
Sales	2,435	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902
Sub-total	4,600	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902
II. Outflow									
Investment and Replacement Costs	3,093					543		652	
Operating Costs	1,372	2,130	2,130	2,130	2,130	2,130	2,130	2,130	2,130
Debt Service									
Interest	260	260	208	156	104	52			
Principal		433	433	433	433	433			
Sub-total	4,725	2,823	2,771	2,719	2,667	3,158	2,130	2,782	2,130
III. Surplus or (Deficit)	(125)	79	131	183	235	(256)	772	120	772
IV. Cumulative	(125)	(46)	85	268	503	247	3,335	3,455	6,543

1/ Growing cucumbers and green peppers.

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SECOND AGRICULTURAL CREDIT PROJECT

Farm Model

Silk Worm Rearing House

Year	Without Project	1	2	3	4	5	6	7-10	11	12	13	14-15	16	17-20
Area-Hectares														
Mulberry 1/	.35	.35												
Yield		(kg/ha)												
Cocoons @ W 1400 /kg 3/	340 2/	650	970	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Mulberry Branches @ W300/bundle	70	100	110	110	110	110	110	110	110	110	110	110	110	110
Silkworm Litter @ W 6/kg	2000	4500	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Increase cocoon quality 4/ @ W 200/kg														
		(W '000)												
Sales														
1. Sericulture														
Cocoons	166.6	476.0	543.2	560.0	560.0	560.0	560.0	560.0	560.0	560.0	560.0	560.0	560.0	560.0
By-products	11.6	20.0	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1
Total	178.2	496.0	565.3	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1
Investment 5/ and Replacement Cost														
Rearing House (22.5 pyongs)		765.0	-	-	-	-	-	-	-	-	-	-	-	-
Equipment for rearing house		186.0	-	-	-	-	178.0	-	186.0	-	-	-	178.0	-
Fertilizer		26.4												
Manure		26.3												
Pesticides - (Mulberry)		9.9												
Labor (field) 6/		45.5												
Hired Animals		19.6												
Lime		0.7												
Silk worm eggs, 4 cases		9.1												
Sterilizers		9.7												
Other materials		2.0												
Labor - (Worms) 6/		35.2												
Establish mulberry fields		-								83.2	62.4			
Sub-total		1135.4					178.0		186.0	83.2	62.4		178.0	
Operating Costs														
A. Mulberry field														
Fertilizers	-	-	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4
Manure	17.5	-	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3
Pesticides	-	-	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9	9.9
Labor 6/	35.0	-	45.5	45.5	45.5	45.5	45.5	45.5	45.5	45.5	45.5	45.5	45.5	45.5
Hired Animals	10.5	-	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6	19.6
Lime	0.5	-	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Sub-total	63.5	-	128.4	128.4	128.4	128.4	128.4	128.4	128.4	128.4	128.4	128.4	128.4	128.4

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SECOND AGRICULTURAL CREDIT PROJECT

Farm Model

Silk Worm Rearing House

Operating Costs (Cont'd)	Without Project	1	2	3	4	5	6	7-10	11	12	13	14-15	16	17-20
B. Silk Worm Rearing														
Silk Worm Eggs	9.1	11.3	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
Sterilizers	8.0	12.1	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2	24.2
Other materials	2.0	2.5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Labor 6/	57.4	44.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0	88.0
Maint. & Repair	-	-	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Sub-total	76.5	69.9	162.9	162.9	162.9	162.9	162.9	162.9	162.9	162.9	162.9	162.9	162.9	162.9
Total	140.0	1205.3	291.3	291.3	291.3	291.3	469.3	291.3	477.3	374.5	353.7	291.3	469.3	291.3
Net Value	38.2	(709.3)	274.0	290.8	290.8	290.8	112.8	290.8	104.8	207.6	228.4	290.8	112.8	290.8
Incremental Value		(747.5)	235.8	252.6	252.6	252.6	74.6	252.6	66.6	169.4	190.2	252.6	74.6	252.6

Rate of Return 30%

1/ Project based on farmer already having established mulberry plantings but in need of improved rearing facilities.

2/ Price below average due to lower quality cocoons as a result of inadequate space, sanitation, rearing methods and disease control.

3/ Young mulberry, 4 year old, low production, little or no fertilizer or insecticides used. 4 case without project, 9 cases first year of project and 10 cases each year thereafter. Yield per case before project 30 kg/case, 1st year of project, 33kg/case, 2nd year 34 kg/case and 3rd year on 35 kg/case.

4/ Improve quality as a result of proper housing, pivot cocoon-bed, improve sanitation and disease control.

5/ Investment provides financing for one year's inputs and improved cultural practices for the mulberry field and for the rearing costs of the first batch of 4 cases of silk worms in the new rearing house.

6/ Family labor is included and makes up 80% before the project and 72% after the project of the total labor requirements.

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SECOND AGRICULTURAL CREDIT PROJECT

Silk Worm Rearing House

Farmer's Loan Cash Flow
(₩ 000's)

Years	1	2	3	4	5	6	7	8	9	10	11	12	13
Inflow													
Loan	794.8	-	-	-	-	-	-	-	-	-	-	-	-
Sales	496.0	565.3	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1
Sub-total	1,290.8	565.3	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1	582.1
Outflow													
Investment and replacement cost	1,135.4					178.0					186.0	83.2	62.4
Operating cost	69.9	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3	291.3
Debt Service													
Interest	95.4	95.4	95.4	81.8	68.1	54.5	40.9	27.3	13.7	-	-	-	-
Principal	-	-	113.5	113.5	113.5	113.5	113.5	113.5	113.8	-	-	-	-
Sub-total	1,300.7	386.7	500.2	486.6	472.9	637.3	445.7	432.1	418.8	291.3	477.3	374.5	353.7
Surplus or (Deficit)	(9.9)	178.6	81.9	95.5	109.2	(55.2)	136.4	150.0	163.3	290.8	104.8	207.6	228.4
Cumulative	(9.9)	168.7	250.6	346.1	455.3	400.1	536.5	686.5	849.8	1,140.6	1,245.4	1,453.0	1,681.4

Years	14	15	16	17	18	19	20
Inflow							
Loan							
Sales	582.1	582.1	582.1	582.1	582.1	582.1	582.1
Sub-total	582.1	582.1	582.1	582.1	582.1	582.1	582.1
Outflow							
Investment & Replacement Cost			178.0				
Operating Cost	291.3	291.3	291.3	291.3	291.3	291.3	291.3
Debt Service							
Interest	-	-	-	-	-	-	-
Principal	-	-	-	-	-	-	-
	291.3	291.3	469.3	291.3	291.3	291.3	291.3
Surplus or (Deficit)	290.8	290.8	112.8	290.8	290.8	290.8	290.8
Cumulative	1,972.2	2,263.0	2,375.8	2,666.6	2,957.4	3,248.2	3,539.0

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SECOND AGRICULTURAL CREDIT PROJECT
APPLE ORCHARD (1.5 Ha): FARM MODEL

(w '000)

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
I. Cropping Pattern																									
Apple Orchard 1.5 ha																									
Intercrop Soybean 1 ha																									
II. Production																									
Apple (tons)																									
Standard trees (0.75 ha)				0.2	0.7	2.2	3.7	4.8	8.5	9.6	11.0	12.2	14.7	16.2	17.7	19.2	20.7	21.7	22.7	22.7	22.7	22.7	22.7	22.7	22.7
Dwarf trees (0.75 ha)				2.2	5.5	11.4	18.8	24.8	27.7	31.7	31.7	31.7	31.7	31.7	31.7	27.7	26.7	26.7	26.7	26.7	23.7	20.7	16.8	12.9	11.9
Subtotal				2.4	6.2	13.6	22.5	29.6	36.2	41.3	42.7	43.9	46.4	47.9	49.4	46.9	47.4	48.4	49.4	49.4	46.4	43.4	39.5	35.6	34.6
Soybean (Kg)	900	900	900	900	900																				
III. Sales																									
Apple - w 120/Kg				288	744	1,632	2,700	3,552	4,344	4,956	5,124	5,268	5,568	5,748	5,928	5,628	5,688	5,808	5,928	5,928	5,568	5,208	4,740	4,272	4,152
Soybean - w 160/Kg	144	144	144	144	144																				
Subtotal	144	144	144	432	888	1,632	2,700	3,552	4,344	4,956	5,124	5,268	5,568	5,748	5,928	5,628	5,688	5,808	5,928	5,928	5,568	5,208	4,740	4,272	4,152
IV. Investment and Replacement Costs																									
Saplings:																									
Dwarf 600 @ w 570 each	342	34																							
Standard 150 @ w 300 ea.	45	5																							
Land Preparation	437																								
Labor	320	235	225																						
Fertilizer/manure/lime	102	78	82																						
Pesticides/borax	52	65	89																						
Small hand tools	60	8	8																						
Power sprayer		210					105					275					125					350			
Concrete mixing tank	40																								
Miscellaneous	15	17	26																						
Soybean Development	114																								
Subtotal	1,527	652	430				105					275					125					350			
V. Operating Costs																									
Apples:																									
Fertilizer/manure/lime				88	98	106	117	131	142	160	166	170	175	180	180	180	180	190	190	190	190	190	190	190	190
Pesticide/borax				90	132	192	237	277	312	361	379	398	405	418	424	438	438	438	438	438	438	438	438	438	438
Fuel for sprayer				20	25	35	50	60	70	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
Boxes for apple sale				23	63	138	228	300	360	410	433	445	455	485	500	475	480	490	500	500	470	440	400	360	350
Labor				304	340	410	475	535	580	633	649	664	664	690	731	712	717	719	723	723	714	705	696	691	678
Miscellaneous				20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Subtotal				545	678	901	1,127	1,323	1,484	1,669	1,732	1,782	1,804	1,878	1,940	1,910	1,920	1,942	1,956	1,956	1,917	1,878	1,829	1,784	1,761
Soybean:																									
Seed		5	5	5	5																				
Fertilizer/manure		25	25	25	25																				
Labor		79	79	79	79																				
Miscellaneous		5	5	5	5																				
Subtotal		114	114	114	114																				
VI. Total Costs (IV & V)	1,527	766	544	659	792	901	1,232	1,323	1,484	1,669	1,732	2,057	1,804	1,878	1,940	1,910	2,045	1,942	1,956	1,956	1,917	2,228	1,829	1,784	1,761
VII. Net Incremental Value (III-VI)	(1,373)	(622)	(400)	(227)	96	731	1,468	2,229	2,860	3,287	3,392	3,211	3,764	3,870	3,988	3,718	3,643	3,866	3,972	3,972	3,651	2,980	2,911	2,488	2,391

FINANCIAL RATE OF RETURN: 33%

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SECOND AGRICULTURAL CREDIT PROJECT

Apple Orchard (1.5 Ha): Farmer's Cash Flow
(W '000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
I. Inflow																									
Loan	1,069	456	301																						
Sales	144	144	144	432	888	1,632	2,700	3,552	4,344	4,956	5,124	5,268	5,568	5,748	5,928	5,628	5,688	5,808	5,928	5,928	5,568	5,208	4,740	4,272	4,152
Subtotal	1,213	600	445	432	888	1,632	2,700	3,552	4,344	4,956	5,124	5,268	5,568	5,748	5,928	5,628	5,688	5,808	5,928	5,928	5,568	5,208	4,740	4,272	4,152
II. Outflow																									
Investment and Replacement Costs	1,527	652	430				105					275					125					350			
Operating Costs		114	114	659	792	901	1,127	1,323	1,484	1,669	1,732	1,782	1,804	1,878	1,940	1,910	1,920	1,942	1,956	1,956	1,917	1,878	1,829	1,784	1,761
Debt Service																									
Interest	128	183	219	219	219	219	219	219	164	110	55														
Principal								456	456	456	458														
Subtotal	1,655	949	763	878	1,011	1,120	1,451	1,998	2,104	2,235	2,245	2,057	1,804	1,878	1,940	1,910	2,045	1,942	1,956	1,956	1,917	2,228	1,829	1,784	1,761
III. Surplus or (Deficit)	(442)	(349)	(318)	(446)	(123)	512	1,249	1,554	2,240	2,721	2,879	3,211	3,764	3,870	3,988	3,718	3,643	3,866	3,972	3,972	3,651	2,980	2,911	2,488	2,391
IV. Cumulative	(442)	(791)	(1,109)	(1,555)	(1,678)	(1,166)	83	1,637	3,877	6,598	9,477	12,688	16,452	20,322	24,310	28,028	31,671	35,537	39,509	43,481	47,132	50,112	53,023	55,511	57,902

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SECOND AGRICULTURAL CREDIT PROJECT
SPRINKLER IRRIGATION (2 HA APPLE ORCHARD): FARM MODEL

	Year	1	2	3	4	5	6	7	8	9	10	11	12-15	16	17-19	20	21	22-25
I.	Production (tons)																	
	With Project	27.7	34.6	40.2	44.6	53.4	58.1	61.7	64.0	66.4	68.8	70.0	71.1	71.1	71.1	71.1	71.1	71.1
	Without Project	27.7	32.6	36.6	40.5	44.5	48.4	51.4	53.4	55.3	57.3	58.3	59.3	59.3	59.3	59.3	59.3	59.3
II.	Sales																	
1.	With Project - w 107/Kg	2,964	3,702	4,301	4,772	5,714	6,217	6,602	6,848	7,105	7,362	7,490	7,608	7,608	7,608	7,608	7,608	7,608
2.	Without Project - w 97/Kg	2,687	3,162	3,550	3,929	4,317	4,695	4,986	5,180	5,364	5,558	5,655	5,752	5,752	5,752	5,752	5,752	5,752
3.	Gross Benefits (1-2)	277	540	751	843	1,397	1,522	1,616	1,668	1,741	1,804	1,835	1,856	1,856	1,856	1,856	1,856	1,856
III.	Investment and Replacement Costs																	
	Well	500					45					45		45			45	
	Pumping Station 1/	580									150					150		
	Sprinkler System 2/	1,390					120					120		120			120	
	Installation cost	180																
		2,650					165				150	165		165		150	165	
IV.	Operating Cost																	
	Labor	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45
	Fuel	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91	91
	Maintenance/repairs	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
		164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164
V.	Net Benefit (II 3-III-IV)	(2,537)	376	587	679	1,233	1,193	1,452	1,504	1,577	1,490	1,506	1,692	1,527	1,692	1,542	1,527	1,692

FINANCIAL RATE OF RETURN: 35%

1/ Diesel engine, pump, pump base, sluice valves, and pipes.
2/ PVC pipes for main lines and lateral lines, steel riser pipes, pipe fittings and sprinkler heads.

Annex 5
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Table G-6

KOREA
SECOND AGRICULTURAL CREDIT PROJECT
Sprinkler Irrigation (2 Ha Apple Orchard): Farmer's Cash Flow
(W '000)

	Year	1	2	3	4	5	6	7	8	9	10	11	12-15	16	17-19	20	21	22-25
I.	Inflow																	
	Loan	1,855																
	Increases in sales	277	540	751	843	1,397	1,522	1,616	1,668	1,741	1,804	1,835	1,856	1,856	1,856	1,856	1,856	1,856
	Sub-total	2,132	540	751	843	1,397	1,522	1,616	1,668	1,741	1,804	1,835	1,856	1,856	1,856	1,856	1,856	1,856
II.	Outflow																	
	Investment and Replacement Costs	2,650					165				150	165		165		150	165	
	Operating Costs	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164
	Debt Service																	
	Interest	223	223	223	223	178	134	89	45									
	Principal				371	371	371	371	371									
	Sub-total	3,037	387	387	758	713	834	624	580	164	314	329	164	329	164	314	329	164
III.	Surplus or (Deficit)	(905)	153	364	85	684	688	992	1,088	1,577	1,490	1,506	1,692	1,527	1,692	1,542	1,527	1,692
IV.	Cumulative	(905)	(752)	(388)	(303)	381	1,069	2,061	3,149	4,626	6,116	7,622	14,390	15,917	20,993	22,535	24,062	30,830

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

H. ECONOMIC ANALYSIS

1. Direct benefits of the Project would come from the increase in production resulting from the various subproject investments. At current prices, the estimated annual incremental output at full development, ranging from about 5 to 15 years, would amount to about US$32 million. The increased production of fruits and vegetables would improve nutritional standards of the local diet. Mainly for export, the incremental output of cocoons would generate an export income of about US$3.4 million at June 1975 prices, although the farmers involved would receive about US$2.8 million in terms of their cocoon sales. The increased availability to the consumer of vegetables and fruits during the offseason are added benefits. In addition to providing increased employment and incomes to the farmer subborrowers, the significance of the Project is further enhanced by the fact that a greater part of the increased output would be the result of a fuller and more efficient use of existing land and labor resources through improved technology.

2. The Project would directly benefit about 7,900 farmer subborrowers and their families or a total of some 47,000 persons. At full development production, the additional labor required annually has been estimated at about 7,200 man year equivalent (1,806,000 man-days). It is envisioned that part of the labor required would be supplied by family labor. Additional employment resulting from expanded marketing activities would also add to Project benefits.

3. The economic rates of return from the Project investments have been calculated based on the following assumptions:

(i) Current prices received by farmers have been used to estimate the benefits.

(ii) Cost streams have been adjusted by deducting taxes and import duties, and adding on subsidies.

(iii) A shadow rate of foreign exchange estimated at 1.135 or ₩ 550 per US$ have been used in the economic analysis. The shadow rate for foreign exchange was estimated using the following formula:

$$SCF = \frac{M + X}{M(1 + t_m + tQ_m) + X(1 - t_x)}$$

where: SCF = Standard Conversion Factor

M = Five-year average of merchandize imports

X = Five-Year average of merchandize exports

t_m = Taxes on imports

t_x = Net value of taxes/subsidies on exports

tQ_m = Tariff equivalents of import quotas

Using 1969-1973 values, the SCF was estimated at 0.881. The shadow rate of foreign exchange is the reciprocal of the SCF multiplied by the official exchange rate.

4. Based on the above assumptions but without the use of the estimated shadow price for foreign exchange, the economic rates of return would range from 29% to 38% as shown below and in attached Table H-1:

	Economic Rate of Return (%)
Apple Orchard	30
Silk Worm Rearing House	32
Sprinkler Irrigation	38
Green House	38
On-farm storage	29

Using the shadow price concerned to adjust the cost streams, the rates would be from 27% to 36% which are satisfactory.

5. To test the subprojects against changes in investment costs and production results, a sensitivity analysis has been carried out. By increasing the cost of the investments by 20% without increasing the value of the benefits, the rates would be from 21% to 30%. The figures would be 20% to 29% if the value of the net benefits were to decline by 20% without changing the costs of the investments.

REPUBLIC OF KOREA

SECOND AGRICULTURE CREDIT PROJECT

ECONOMIC RATES OF RETURN

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	-	-	-	-	-	-	-	-	-	-	- THOUSAND WON				-	-	-	-	-	-	-	-	-	-	-
1. Apple Orchard Development																									
a. Incremental Sales	144	144	144	432	888	1,632	2,700	3,552	4,344	4,956	5,124	5,268	5,568	5,748	5,923	5,628	5,688	5,808	5,928	5,928	5,568	5,208	4,740	4,272	4,152
b. Investment & Replacement Costs	1,699	734	470				125					327					149					417			
c. Operating Costs		125	125	709	846	948	1,179	1,380	1,546	1,739	1,805	1,857	1,881	1,856	2,018	1,988	1,998	2,025	2,041	2,041	2,000	1,963	1,913	1,866	1,845
Net Benefits (a-b-c)	- 1,555	- 715	- 451	277	42	684	1,396	2,172	2,798	3,217	3,319	3,084	3,687	3,892	3,905	3,640	3,541	3,783	3,887	3,887	3,568	2,828	2,827	2,484	2,307
ECONOMIC RATE OF RETURN = 30.0%																									
2. Sericulture Rearing House																									
a. Incremental Sales	317	388	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404	404					
b. Investment & Replacement Costs	1,064					178					186	87	65			178									
c. Operating Costs	-69	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164	164					
Net Benefits (a-b-c)	- 678	224	240	240	240	62	240	240	240	240	54	153	175	240	240	62	240	240	240	240					
ECONOMIC RATE OF RETURN = 32.0%																									
3. Greenhouses																									
a. Sales	2,435	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902	2,902										
b. Investment & Replacement Costs	2,844					471					574														
c. Operating Costs	1,382	2,169	2,169	2,169	2,169	2,169	2,169	2,169	2,169	2,169	2,169	2,169	2,169	2,169	2,169										
Net Benefits (a-b-c)	- 1,824	700	700	700	700	229	700	700	700	700	126	700	700	700	700										
ECONOMIC RATE OF RETURN = 38.0%																									
4. On-Farm Storage																									
a. Incremental Sales	541	585	634	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657	657
b. Investment Costs	2,080			53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53		
c. Operating Costs	83	123	132	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135	135
Net Benefits (a-b-c)	-1,622	462	502	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	469	522	522
ECONOMIC RATE OF RETURN = 29.0%																									
5. Sprinkler Irrigation																									
a. Incremental Sales	277	540	751	843	1,397	1,522	1,616	1,668	1,741	1,804	1,835	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856	1,856
b. Investment & Replacement Costs	2,375					153				134	153					153				134	153				
c. Operating Costs	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155
Net Benefits (a-b-c)	-2,253	385	596	688	1,242	1,214	1,461	1,513	1,586	1,515	1,527	1,701	1,701	1,701	1,701	1,548	1,701	1,701	1,701	1,567	1,548	1,701	1,701	1,701	1,701
ECONOMIC RATE OF RETURN = 38.0%																									

KOREA

SECOND AGRICULTURAL CREDIT PROJECT

I. RECOMMENDATIONS AND LOAN CONDITIONS

1. The following are the main loan conditions on which agreement was reached during negotiations:

(a) Participating Kun Cooperatives would meet the conditions specified in Chapter C para 9 and 31;

(b) An agricultural economist, and two horticulturists specializing in green house vegetable production and sprinkler irrigation for orchards respectively, would be appointed and in position within three months following Loan effectiveness (Chapter C para 32); and

(c) Subloan repayment periods would not exceed those indicated in Chapter D para 7.

2. Conditions of Loan effectiveness would be the execution of agreements between the Government and NACF, and NACF and the PKCs which are acceptable to IBRD (Chapter D para 6).

3. Given agreement on the abovementioned conditions, the proposed Project is suitable for an IBRD loan of US$20 million.

ANNEX I

KOREA

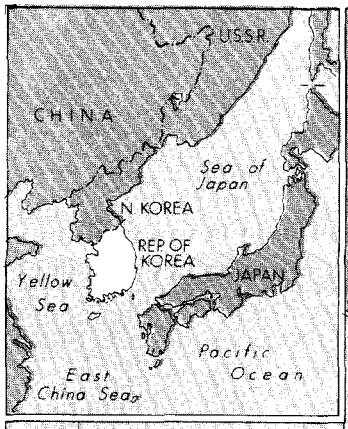
SECOND AGRICULTURAL CREDIT PROJECT

Additional Reports and Data Related to the Project Available in the Bank

1. THE SECOND AGRICULTURAL CREDIT PROJECT, AUGUST 1975 (Project preparation report by the National Agricultural Cooperative Federation, Seoul, Republic of Korea).

2. Tables on economic rates of return by subprojects and the Project as a whole.

IBRD 10375
APRIL 1973



KOREA

Expressways
Expressways under construction
Primary roads
Railways
Railways under construction
Airports
Ports
Rivers
Special cities
Provincial boundaries
International boundaries

KILOMETERS 0 20 40 60 80 100 120 140 160
MILES 0 20 40 60 80 100